Ontario

Advisory Council on Occupational Health and Occupational Safety

Tenth Annual Report
April 1, 1987
to March 31, 1988

89-01542/

Mandate and Objectives

The function of the Advisory Council is and it has power to*:

a) make recommendations to the Minister of Labour relating to programs of the ministry in occupational health and occupational safety; and
b) advise the minister on matters relating to occupational health and occupational safety which may be brought to its attention or be referred to it.

To achieve this Council has set the following objectives:

Primary Objective

To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary Objectives

1. To ensure as far as is possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as is possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as is possible that there is appropriate manpower training and development for the occupational health and safety field.
5. To review periodically the effectiveness of the policies and programs implemented to achieve secondary objectives 1 to 4.**

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* The Occupational Health and Safety Act. s. 10(7).

** added June, 1980

Advisory Council on Occupational Health and Occupational Safety

Tenth Annual Report
April 1, 1987
to March 31, 1988

400 University Ave.,
11th Floor,
Toronto, Ontario
M7A 1T7

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A French translation of this report will be available at a later date.

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Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Office of the
Chairman

Bureau du
président

400 University Avenue
Toronto, Ontario
M7A 1T7

416/965-2448

June 1, 1988

The Honourable Gregory Sorbara
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Sorbara:

I have the honour to submit the Tenth Annual Report of the Advisory Council on Occupational Health and Occupational Safety for the fiscal year 1987-1988.

Respectfully,

DRMcCalla

D.R. McCalla
Chairman

Attachment

Advisory Council on Occupational Health and Occupational Safety Members and Officers 1987–88

R.T. Boldt (1988)
Dow Chemical Canada, Inc.
(retired)
Sarnia

T. Byrne (1988)*
Prov. Bldg. & Constn.
Trades Council
Etobicoke

A.G. Cecutti (1989)**
Falconbridge Ltd.
Falconbridge

D.N. Dewees (1988)
University of Toronto
Toronto

J.C. Divitt (1989)***
Canadian Union of
Public Employees
Scarborough

A. Dong (1987)***
Wellesley Hospital
Toronto

R. Falconer (1988)*
United Steelworkers
of America
Toronto

J. Gill (1988)
Canadian Automobile
Workers
North York

D.R. McCalla (1989)****
(Chairman)
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Hamilton

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University of Western
Ontario
London

D.G. Morrison (1989)*
Stelco Inc.
Hamilton

H.D. Moyer (1989)†
General Motors of Canada
(retired)
Oshawa

G.M. Nipshagen (1988)*
Leaver Mushrooms Co. Ltd
Campbellville

S. O'Flynn (1989)***
Ontario Federation of Labour
Don Mills

D. B. Smith (1988)
Ellis-Don Ltd.
London

C.J. Tuohy (1988)
(Vice-Chairman)
University of Toronto
Toronto

D. Ublansky (1988)
Energy & Chemical
Workers Union
London

J.L. West (1988)*
University of Windsor
Windsor

V. Biggar
Executive Co-ordinator

P.L. Chan
Research Officer

J. Eakin††
Research Officer

S. Spencer
Research Officer

N.R. Subramanian
Administrative Assistant

Members' terms expire(d) on October 31 of the year indicated in parentheses except where indicated.

* December 10
** March 24
*** December 9
**** January 31
† November 1
†† Part-time, from March 1988

Preface

This being council's tenth annual report, council decided to use the Introduction to comment on common issues, themes and theses that have run through council's work in the past decade. It was considered that a review of past work and advice and also a consideration of the evolution needed to deal with the issues of the time could provide an indication of the type of mechanisms that will be needed to deal with issues that will arise in the future.

As in other years, council considered a wide range of topics and issues. Council completed the reviews of the processes of developing the designated substance regulations that it had underway at the time it made the decision to withdraw, at least temporarily, from the review process. The three reviews included in this annual report are reflective of three different processes and three different results. One result was a proposed amendment to an existing designated substance regulation (respecting mercury); the second result was a proposed designated substance regulation specific for construction and aggregate producers; and the third was a more traditional process that had been protracted due to scientific uncertainty, and the means of dealing with the uncertainty, about the chronic health effects of formaldehyde.

Council also continued its consideration of the occupational health and safety aspects of biotechnology and submitted advice to the minister. Issues around health surveillance have often been discussed, and council had submitted advice on the Physician in Health Surveillance in 1983 and on Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs in 1985. This year a new task force was established to consider, specifically, the provision for mandatory medical examinations in the proposed designated substance regulations that did not include a provision for medical surveillance. Advisory memoranda on mandatory post-exposure medical examinations and on mandatory health surveillance are included in this annual report.

New task forces were also established to consider the very important issues of education, training and information transfer and the issue of small business. Council has discussed many current topics, including proposals with respect to amendment of the *Occupational Health and Safety Act*, and considered that its advice would be of value to the minister.

During the year, council invited a number of individuals to address and discuss various topics with council. Included were the minister, deputy minister, assistant deputy minister of the Occupational Health and Safety

Division, the chairman and the president and chief executive officer of the Canadian Centre for Occupational Health and Safety, the chairman of the Ontario Occupational Health and Safety Education Authority and individuals from Quebec knowledgeable about the occupational health and safety system in that province.

The last section of this annual report contains details on the administration of council and its task forces, such as objectives, terms of reference, membership and meeting dates.

The appendices at the end of the report contain a variety of statistics, including: the number and frequency rate of compensated disabling injuries and days lost for temporary total disability by nature of injury, industry and occupation, and disabling injury claims and days of total temporary disability by detailed Standard Industrial Classification. Council is grateful to the Workers' Compensation Board of Ontario for these statistics and for the assistance provided by the Information Technology and Systems Branch of the Ministry of Labour.

As always, council remains indebted to the non-council members of council's task forces, who were appointed to particular committees to contribute their expertise, for their invaluable assistance. Council also expresses its gratitude for the support and co-operation it has received from members of labour and management and from private and public associations and agencies, including educational institutions. Council is grateful to Dr. Alice Dong for her contribution and commitment to council and the medical examinations task force during her term as a member of council.

INTRODUCTION

Occupational Health and Safety: An Evolving Scene

Council, in it's first report in 1978[1], stated that it would use the introductory section of its annual reports to share '... some general observations on selected matters of significance for the future of occupational health and safety in Ontario.' Among the issues that have been considered are the importance of various factors such as life style, living conditions, the environment, and the impact of new knowledge and advanced technology as major determinants of human health, the importance of information and participation, especially for fostering co-operative approaches to problem solving, and the need for planning and research. The Introductions have also contained some general comments about the work that council performed during the year and work currently underway.

This being council's tenth year, it was decided to use the Introduction to make some general observations on the activities and issues of the past decade, noting similarities in the principles that have run through much of the council's work, and to consider briefly some future directions for the protection of health and safety in the workplace.

The *Occupational Health and Safety Act,* which came into force 10 years ago, defines the rights and responsibilities of the various parties for protecting the health and safety of workers in Ontario. It appears that the basic philosophy of the Act is 'internal responsibility'. The introduction of mandated joint health and safety committees and other consultative concepts can be said to have ushered in the present era of occupational health and safety endeavours in the province. The Act also provides mechanisms for resolving differences between the workplace parties through the intervention of inspectors and other ministry personnel. Considerable time has been needed to determine the impact of the Act, to work out the best ways to achieve its objectives and to define the most appropriate role and responsibilities for the minister, the Ministry of Labour, the workplace parties and council. As with any complex and dynamic system there will always be questions about whether the present scheme represents the best balance achievable and whether the system will be able to evolve fast enough to meet future needs.

Perhaps the greatest challenge council has had in striving to meet its objectives in occupational health and safety has been the balancing of 'opposing forces'. This has also been, and remains, a challenge for the ministry and for the workplace parties. It is not only a matter of balancing divergent views but of dealing most effectively with what could be considered 'opposing forces', such as the need for adequate time for consultation against the need for expedient action, the need for general, flexible principles against the need to specify defined individual procedures and exposure limits, and the need for enforcement against the need for increased education of workers and supervisors. However, council recognizes that the best solution may not be a simple balance or compromise but a, perhaps novel, position that takes into account the various components of each force for an optimal net benefit.

Council was created, in part, to help the Minister of Labour find a workable balance among the sometimes divergent views and interests of labour, management and the public. In determining the best mechanism for trying to achieve a balance, the pros and cons of an adversarial versus consensus approach to problem solving have to be considered. In its own work, council has generally used a consensus approach to achieve a dynamic balance, to help foster understanding and to develop advice for the minister. The process of reaching consensus has involved extensive discussion among members, each of whom brings his or her own views and experiences from management, labour or the public sector. In a few instances council has not been able to achieve consensus, and its advice to the minister has indicated the range of views.

The specific method used by council to seek information and input has depended upon the nature of the issue being investigated and the kind of input being sought. Council has made very extensive use of task forces composed of council members and outside experts bringing experience or understanding of specific areas of study. The reports prepared by the task forces have served as the basis for council's discussion and thus assisted in the preparation of advisory memoranda. On one occasion council prepared a discussion paper (on carcinogens[2]), which it circulated widely to interested parties, and the input was considered in the preparation of an advisory memorandum.[3] For biotechnology, where council wished to survey the views of those with relevant experience and knowledge of the issues, council held an invitational workshop.[4] Visits to various locations to consider selected industries have also been conducted.[5] With a view to evaluating the role of joint health and safety committees in fulfilling the purpose of the Act, council commissioned and worked closely with a consultant through all major aspects of a large-scale questionnaire survey of joint health and safety committees. The survey gathered data independently from labour and management in a stratified random sample of Ontario workplaces.[6]

In the decade of its existence council has explored many themes, raised many questions and provided advice to the minister of the time on many diverse issues. A number of general theses that were enunciated in council's early advisory memoranda have continued to guide council's work. These include:

- the need for consultation and for involvement of the affected parties, both in the development of legislation and regulations and in the implementation of programs in the workplace. Council, from its inception, has stressed the need for consultation and participation and believes that, if affected parties have opportunity to provide input and to participate in processes that affect them, a reasonable balance can be reached. Further, even if the conflicts cannot be totally resolved, the resulting decisions will be more acceptable to the affected parties because the basis for the position of each party will be clear to all;

- the need for co-ordination and co-operation, with and between the workplace parties and with other organizations and associations involved in the provision of services, and with other government departments and agencies involved in the development of standards and activities directed toward the prevention of accidents and illnesses in the workplace;
- the central importance of education, training and information transfer to workers, supervisors and management;
- the need for prevention and a proactive approach to occupational health and safety, emphasizing the need both to prevent illnesses and accidents and to prevent workers from being exposed to hazardous agents or situations. It has been stressed that this approach requires planning, research and data collection, both at the workplace and in government, as well as a proactive approach to the identification of potentially hazardous substances, processes and situations, ideally, before they are introduced into the workplace. The value and importance of this approach have also been emphasized in recent reports prepared by the Evans[7] and the Spasoff[8] committees for the Ministry of Health.

Joint health and safety committees were included in the Act as a key means of facilitating participatory processes in the workplace. A survey of committees conducted by council in 1985 provided a great deal of data on compliance with the Act, perceptions of the way committees were functioning and reasons for successes and problems. From these data, council was led to make a number of recommendations that were designed to aid committees in functioning more effectively.[9] Among these were: that committees be required to have two co-chairmen, one from labour and one from management; that management be required to respond in writing to the committee's recommendations; and that additional training for workers, managers and committee members should be provided.

One of council's early advisory memoranda[10] included recommendations for the process the ministry should use to establish standards, guidelines and codes of practice. The memorandum stressed the need for openness and ample opportunity for consultation with the affected parties. It concluded that the role for council '... is to review the process. In so doing, it will examine the criteria used to evaluate a hazard and will follow the process through to the final form, be it a Standard, Guideline or Code of Practice'.[10]

Commencing in 1981, with the development of the first designated substance regulations, much of council's work has been directed toward these regulations. Early advisory memoranda on such issues as the role of economic analysis[11] and the interpretation of health effects data[12] provided the minister with advice on principles to be used when collecting and analysing data for determining whether a given agent should be designated and in deciding the nature of regulation and the most appropriate exposure limits. At the same time, council commenced reviewing the process the ministry used to develop each individual designated substance regulation. Some general issues arose repeatedly in a number of the regulations being reviewed. This, in turn, led council to develop advice on a number of other matters, e.g. principles for dealing with reproductive hazards,[13] factors to be considered when determining which substance should be regulated[14] and policies relating to medical surveillance.[15][16][17]

The designation process created a number of new dilemmas. Sometimes, these arose because of apparently opposing forces, such as the need for the process to be open and to allow adequate time and opportunity for public comment versus the need to prepare regulations in a timely fashion and to proceed as quickly as possible to the regulation of a large number of agents. As the process of designating individual substances continued, there were also conflicts between the advantages of keeping the process and format relatively standardized and the need to make each regulation as appropriate as possible for a specific substance.

Council, also, has grappled with dilemmas and conflicts in its own role. On the one hand was the role of providing general advice on policy and principles, and, on the other, the matter of advising the minister on specific and detailed issues. Council consistently took the view that its role in reviewing the designated substance regulations was to consider the process of developing the regulations, including both the consultative process and the review of the available data, rather than devising or endorsing the particulars of the regulations. Nevertheless, the public perception was often somewhat different – namely, that council was ultimately responsible for the exposure limits and for the details of the designated substance regulations.

Recognizing that the detailed scrutiny of the designated substance regulations was consuming a disproportionate share of council's resources, council decided in 1987 to withdraw, at least temporarily, from the process. More fundamental changes have since been made with the recent establishment by the ministry of the Joint Steering Committee on Hazardous Substances in the Workplace. This body, composed of representatives from both management interests and organized labour and chaired by the assistant deputy minister of the Occupational Health and Safety Division, is to make recommendations to the minister on all matters relating to the development and review of regulations for hazardous substances in Ontario workplaces made under the *Occupational Health and Safety Act*. Council will be watching this new arrangement with great interest, and particularly as the committee grapples with long-standing and controversial matters such as the noise regulation.

The advent of WHMIS has also introduced a major change in the way training and information concerning hazardous substances are to be provided. Council has strongly supported WHMIS and will watch with interest to see if the promised gains in worker protection materialize.

Despite a decade of experience with the Act, the most cursory examination of the Ontario occupational health and safety scene leads inevitably to the conclusion that much work remains to be done. Accident rates remain high, 'sore-thumb' problems continue to arise, and from time to time, receive high profile treatment in the media. Arrangements for health and safety training of workers and supervisors appear to be in a state of flux with no general agreement on the appropriate distribution of responsibility and resources. For these and other reasons, council has established a task force on education.

Similarly, many voices have expressed the need to improve the delivery of occupational health and safety to small business. Recognizing that new approaches, carefully tailored to the needs and tradition of small business, may be required, council has also set up a task force to study this important sector of Ontario's economy.

In the Introduction to its Ninth Annual Report, council noted the importance of trying to develop specific, measurable objectives and of working toward the establishment of information systems that would provide accurate data on performance. The same Introduction noted that organizations and systems must evolve to meet changing situations and needs. Arrangements that may represent a tolerable balance in 1988 are unlikely to serve effectively for an extended period. There continues to be a pressing need to look at the Ontario occupational health and safety system as a whole to ensure that attention and resources are applied where they will be most effective in providing real protection to workers. Council looks forward to continuing to advise the minister and helping to work out the 'evolving balance' needed in the next decade.

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10. Advisory Memorandum 78-II: Policy and Process in Establishing Standards, Guidelines and Codes of Practice in Occupational Health and Safety. In: *Advisory Council on Occupational Health and Occupational Safety, First Annual Report, April 1, 1978 to March 31, 1979.*

11. Advisory Memorandum 79-V: Policy and Principles Concerning Economic Impact Analysis and Occupational Health and Safety. In: *Advisory Council on Occupational Health and Safety, Second Annual Report, April 1, 1979 to March 31, 1980.*

12. Advisory Memorandum 82-V: Principles and Procedures for the Interpretation of Epidemiological Studies. In: *Advisory Council on Occupational Health and Occupational Safety, Fifth Annual Report, April 1, 1982 to March 31, 1983, Volume 1.*

13. Advisory Memorandum 84-II: Concerning Reproductive Hazards in the Workplace. In: *Advisory Council on Occupational Health and Occupational Safety, Seventh Annual Report, April 1, 1984 to March 31, 1985.*

14. Advisory Memorandum 85-I: Criteria and Alternative Approaches for the Control of Hazardous Substances and Agents in the Workplace. Part I – Identification of Criteria. In: *Advisory Council on Occupational Health and Occupational Safety, Eighth Annual Report, April 1, 1985 to March 31, 1986, Volume 1.*

15. Advisory Memorandum 85-II: Classification of Health Surveillance, Health Screening and Biological Surveillance Programs. *Ibid.*

16 Advisory Memorandum 87-V: Concerning Mandatory Post-exposure Medical Examinations. To be published in: *Advisory Council on Occupational Health and Occupational Safety, Tenth Annual Report, April 1, 1987 to March 31, 1988.*

17. *Advisory Memorandum 87-VI: Concerning Mandatory Health Surveillance.* Ibid.

COUNCIL'S ADVISORY MEMORANDA

Advisory Council on Occupational Health & Occupational Safety
Conseil consultatif de la santé et de la sécurité au travail
Ontario

Office of the Chairman
Bureau du président

400 University Avenue
Toronto, Ontario
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416/965-2448

June 12, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

I am pleased to submit to you council's advice on biotechnology.

This advice follows a series of activities undertaken by council during the last couple of years. Significant among these activities was the workshop on biotechnology organized by council and held in October 1985. As indicated in my letter to you March 24, 1986, council considered biotechnology to be a subject warranting careful and detailed study and a council task force on biotechnology was established in April 1986.

As noted in correspondence from Mr. Ramsay, former Minister of Labour, there has been increasing interest in the use of biotechnology for producing new kinds of pesticides, commercial chemicals and pollution-eating substances and there is the need to consider the protection of the health and safety of workers who may be working in the field.

The enclosed document is intended to serve as a brief introduction to the subject. It emphasizes the need for the Ministry of Labour to develop an agenda for action to deal with biotechnology.

Council recognizes that there are a number of complex issues involved, but stresses that there are a few relatively simple steps that need to be taken in the short-term in order to initiate a systematic, pro-active approach to this new, rapidly developing technology.

Council also recognizes that there is a great deal of work to be done in order to develop a policy and implement a plan of action that will be flexible and sensitive to the long-term needs. Council would be prepared to consider some of these issues in greater detail.

I will be happy to discuss with you any issues arising from the enclosed document or proposals for future work.

Yours truly,

DRMcCalla

D. R. McCalla
Chairman

cc: G. Thompson
: Assistant Deputy Minister's Office
: A. Gladstone
: A. Robinson

Advisory Memorandum 87-I
to the Minister of Labour
June 12, 1987

Biotechnology

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RECOMMENDATIONS*

ACOHOS RECOMMENDATION 87-1

that the Minister of Labour take immediate steps to ensure that an agenda for action on biotechnology be developed for the Ministry of Labour.

ACOHOS RECOMMENDATION 87-2

that, in the interim, the Minister of Labour ensure that the present legislation and regulations be used and that:

1. the present review procedure for new chemicals and biological agents is adequate and appropriate for agents, products and processes of biotechnology;
2. there is the requirement to notify the government of all agents, products and processes classified as potentially hazardous according to existing guidelines. Such notification should include data submission and the requirement for government approval for work at the various stages of the life cycle of the agents, products or processes;
3. agents, products or processes for the purposes of research or those used in small quantities are not exempt from the notification/data submission/approval step when the agents, products or processes are classified as potential hazards according to existing guidelines.

ACOHOS RECOMMENDATION 87-3

that the Minister of Labour ensure that the mechanism for developing a policy includes the opportunity for public participation and the consideration of input from interested and affected parties.

ACOHOS RECOMMENDATION 87-4

that, in developing a policy for the Ministry of Labour, the following issues be considered and addressed:

1. the purpose of the policy;
2. the definition and scope of biotechnology and related terms for the purposes of the policy;
3. the need for a classification scheme to determine what should and should not be included in the policy and to categorize, according to potential hazard, the various levels of concern/regulation/control;
4. the need for a review procedure to be used by the ministry for identifying and assessing the potential for harm;

---

* **Analysis section contains explanation of and rationale for each recommendation.**

5. whether the existing legislation should serve as the basis for dealing with biotechnology or whether new legislation should be developed;

6. the need for a mechanism to ensure ongoing communication with:
   a) scientific experts
   b) other jurisdictions
   c) the public;

7. a mechanism to protect confidentiality of information.

ACOHOS RECOMMENDATION 87-5

that the Minister of Labour ensure that there is sufficient expertise in the ministry, or available to the ministry as a resource, to support and perform the functions described in ACOHOS Recommendations 87-1 to 4, 6 and 7.

ACOHOS RECOMMENDATION 87-6

that the Minister of Labour take steps to ensure that inspectors visiting establishments that are undertaking work in biotechnology receive specific training in biotechnology and the associated potential for hazards.

ACOHOS RECOMMENDATION 87-7

that the Minister of Labour take steps to promote, within government, the development of policies to deal with biotechnology, i.e. products, processes and agents through all stages of their life cycle from research and development through use to disposal, and to initiate a mechanism for co-ordinating the policies between provincial ministries and federal departments.

BACKGROUND

In February 1985 the Honourable Mr. Ramsay, then Minister of Labour, requested advice from the advisory council 'as to the policies and procedures that should be established by the Ministry of Labour to ensure the health and safety of workers as the use of biotechnology increases.'[1] Recognizing that biotechnology is a complex and rapidly developing field, council considered it necessary to gather information on the science, the potential applications, the growth of the industry and the activities of other jurisdictions. Towards this goal council organized a workshop on biotechnology. The proceedings of the workshop, held in October 1985, were submitted to the minister in March 1986.[2]

In April 1986 council established a task force to advise it on the actions needed to ensure adequate protection of workers in biotechnology in Ontario.[3]

INTRODUCTION

Definitions

Different jurisdictions and organizations define biotechnology and related terms differently depending on the purpose and the needs of the organization.

Biotechnology:

A Dictionary Definition:

'Modern applied biology.'

Organization for Economic Co-operation and Development (OECD) (International Organization):

'The application of scientific and engineering principles to the processing of materials by biological agents to produce goods and services.'

National Research Council (NRC): (Canada)

'The application of science and engineering to the direct or indirect use of cells from plants or organisms or micro-organisms, in their natural or modified forms, for the production of goods or the provision of services.'

Ministry of State for Science and Technology (MOSST): (the designated lead agency for biotechnology in Canada)

'The application of science and engineering to the direct or indirect use of living organisms or parts of organisms, products of organisms, in their natural or modified forms, for the production of goods or the provision of services.'[4]

The use of different definitions for different purposes was evident when MOSST conducted a survey of activities in biotechnology in Canada. The definition used in the questionnaire was:

'The utilization of a biological process, be it via microbial, plant or animal cells, or their constituents, to provide goods and services.'[5]

However, MOSST recognized that as organisms and biological processes have been used for centuries to generate commercial products or to perform useful functions, there was a need for a more precise definition to distinguish between 'old' and 'new' biotechnology.[5] Hence, it was stressed that the accent of the survey was on:

*New Biotechnology:**

'New and novel aspects of biological techniques including, but not limited to: genetic manipulation, cell fusion, tissue culture, enzyme and enzyme systems, process and systems engineering and computer-aided protein design.'

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* 'New biotechnology' is often considered synonymous with 'genetic engineering'.

*Genetic Engineering:**

Genetic Engineering is defined by the Office of Technology Assessment (OTA), in the United States as:

'Any technique that uses living organisms to make or modify products, to improve plants and animals, or to develop micro-organisms for specific uses.'

Unlike the description of new biotechnology used by MOSST, this definition of genetic engineering does not list specific techniques but includes any technique that achieves specified objectives. It would appear that this definition includes recombinant-DNA technology, cell fusion, and plant cultures, but probably not immobilized enzyme techniques.

Recombinant DNA (r-DNA) Technology:

Recombinant DNA technology includes a number of specific techniques used to modify genetic material. Although r-DNA techniques are the most important, there are other techniques that can be used for 'genetic engineering'.

It is important to note these distinctions since many of the guidelines and studies that are considered as a basis for controlling biotechnology only deal with recombinant DNA technology or genetic engineering.

The variety of definitions, the distinctions between various techniques, old and new, and the variations due to the purpose for which the definitions are intended have been described to demonstrate the need for a clear comprehensive definition of biotechnology to meet the needs of the Ministry of Labour.

The Science

The difficulties involved with defining biotechnology are due not only to differences in purpose and needs but also to the rapid development of new techniques. As pointed out above, there tends to be a distinction between old and new biotechnology.

Up until the last decade extensive use was made of biological systems, e.g. to brew beer; make bread, cheese and yoghurt; to produce antibiotics and to treat waste, as well as biological techniques to selectively breed animals and plants to produce improved species. However, in the last decade advances in the biological sciences have increased the ability of humans to change or combine the inherited characteristics of micro-organisms, plants and animals, and it is these 'new' techniques that have sparked the present interest in biotechnology.

It was the discovery of the recombinant DNA technique, (i.e. the ability to transfer a piece of DNA into a living cell in a form such that the host cell will 'read' it like its own genetic material) that marked the beginning of the new era in biotechnology. Along with the ability to clone (separate), sequence (determine the specific molecular structure) and synthesize genes, recombinant DNA technology allows us to manipulate living organisms in a specific and reproducible way. Other advances in protein engineering, cell fusion and immobilized enzyme techniques have expanded the scope of biotechnology still further.

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* 'New biotechnology' is often considered synonymous with 'genetic engineering'.

Applications and Potential Applications of Biotechnology

The promises of new biotechnology and its applications have been heralded as potentially solving many of the world's problems, e.g. the use of biomass as a source of food for the hungry, the use of micro-organisms to generate energy, degrade toxic wastes or produce substances to prevent, treat and diagnose certain illnesses.

The potential applications of biotechnology can be classified according to the technique used, e.g.:

a) Recombinant DNA technology used to:

  i) change the biological characteristics of micro-organisms so that the organisms can:
    - degrade toxic pollutants,
    - extract metals from complex ores,
    - infect and destroy insect pests,
    - prevent frost damage to plants,
    - enhance nitrogen fixation.

  ii) insert specific genes into micro-organisms so that the organisms will produce large quantities of complicated organic molecules that have previously been difficult or impossible to synthesize by chemical processes, e.g. growth hormone, insulin, interferon, renin and many enzymes.

b) Cell fusion:

  i) tumour and antibody — forming cells can be fused to produce a hybrid cell (hybridoma), which will produce large quantities of monospecific antibodies. Monospecific (monoclonal) antibodies are extensively used as diagnostic aids and have potential to be used for treatment of certain diseases;
  ii) plant cells — new techniques now allow plant cells to be fused. This technique can be used to confer favourable characteristics into plants, i.e. to improve plant species;
  iii) germ line cells* — can be used to improve animal species.

c) Protein engineering and fixed enzyme technologies can be used to alter the activity of biologically active molecules and to facilitate the synthesis and isolation of specific products.

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* Not strictly cell fusion technique. The product of cell fusion is usually considered to result in a tetrad (i.e. doubling the amount of genetic material of a normal somatic cell).

Growth of Industry

Due to the enormous potential for the application of biotechnology, the number of companies actively engaged in research and development has increased dramatically in the last few years in Canada. Of the 110 companies and organizations listed as being involved with biotechnology in the 1986 biotechnology sourcebook[6], 50 are located in Ontario. It is known that there are other companies and sections of large companies that have workers involved with research and development in the field of biotechnology.

Factors That Will Influence Commercial Development in Canada

Like any new technology, development will depend upon a number of factors, including: the basic scientific information (i.e. the presence and flexibility of the technology), the value and need for its applications, the risks and benefits of using the technology, and social considerations. The factors are complex and interrelated.

It would appear from the literature, the press and the activities of other countries, that biotechnology is ready for commercial development. Assessment of the risks and benefits and the decisions regarding the weights to be assigned to them will largely depend on the social-political structure of a particular jurisdiction. The use of nuclear energy is an example of the different approaches taken by different countries to the development of a new technology.

It is not the intent of this document to debate the issue of whether or not biotechnology should be pursued/encouraged in Canada nor to discuss in detail the activities of the governments of Canada, its major trading partners and international organizations. However, it is important to note the potential applications, benefits and risks and to assess the impact of the government's activities in order to anticipate the growth of the industry and, hence, the extent and nature of the potential for risk to the health and safety of workers in Ontario.

1. International Activities

The flurry of activity in the United States, Japan and Europe with respect to the commercial development and use of biotechnology will have a significant impact on Canada. The need and desire to be competitive in the scientific and economic development of a new technology will influence the direction of policies in Canada, i.e. towards encouraging, funding and regulating research and development. The fact that international organizations like the World Health Organization (WHO) and the OECD have recognized the need to develop international policies and guidelines[7,8] is an indication of the extent and potential for development of the new technology. The standards and policies recommended by such organizations will also influence the direction and degree of commercial development in Canada. Many other countries, including Canada's major trading partners, have already developed policies for the regulation of biotechnology.

2. Federal Government Activities

In 1983 the Minister of State for Science and Technology announced a Biotechnology Strategy for Canada. The goals were to enhance scientific research and industrial applications, encourage skilled human resource development, increase scientific co-operation and technology transfer, and foster an economic and regulatory climate conducive to commercial biotechnology investment and activities.[5]

The federal government has committed $11 million per year to support the strategy and a total of over $100 million for various other activities associated with biotechnology.[6]

3. Ontario Government Activities

Ontario has recently made moves to recognize biotechnology officially, and it is committed to encouraging the development of industrial applications of biotechnology.[5] The Ontario government, in a joint venture with industry and the Canada Development Corporation (CDC), made a large commitment of funds in the formation of Allelix, one of Canada's major biotechnology companies.

Appendix I contains information on the activities of the governments of Canada and Ontario and the National Biotechnology Advisory Committee with respect to encouraging and supporting commercial development, development of policies and regulations and co-ordination of activities both nationally and internationally.

4. Potential Risks Associated with Biotechnology

The potential benefits and applications have been briefly listed above. The potential risks are not so easy to identify. In many cases the risks will be the same or similar to the risks of dealing with other potentially toxic products and organisms. However, new biotechnology, like any new technology, lacks a history of experience. It is at the frontier of science. The applications are still largely unknown and the methodology to estimate risks is not well developed.

Studies indicate that many people judge the risks of nuclear power to be unacceptable in spite of the assurances of experts as to its safety. This perception was considered to be a reflection of people's views that the risks are unknown, dread, uncontrollable, inequitable, catastrophic and likely to affect future generations. DNA technologies seem to evoke several, if not all, of the same perceptions that make nuclear power so hard to manage.[9]

It is probably the 'unknown' that causes the greatest concern. The ability of the human race to create or alter living species into forms that do not exist in nature has been the basis for many classic horror stories.

Toxic or pathogenic agents, or agents about which almost nothing is known are reasons for concern, and the concern is increased by the fact that living agents can multiply and have the potential to spread throughout the environment. The knowledge that genetic material can be transferred from one cell to another and that this genetic material could be expressed perhaps in humans (to produce tumours, insulin, etc.) has also caused concern.

It was only a short time after Cohen and Boyer announced the successful expression of recombinant DNA in the laboratory that the spectre of the public health risks associated with genetic engineering was raised. Due to the concern expressed by some scientists, an international conference was held in Asilomar, California in 1975. The discussion focused on safeguarding the public and the environment from laboratory accidents. The report of the conference led to the formation of the Recombinant DNA Advisory Committee (RAC) in the United States and the development of guidelines for DNA research by the National Institutes of Health (NIH). The guidelines include biological and physical containment standards that were assigned to experiments based on their estimated risks. With increased understanding of the technology and a good 'track record', containment requirements were relaxed in 1982.

The NIH guidelines have been the main source of reference for laboratory safety, and many other countries have followed the United States' model.

In Canada guidelines similar to those of the NIH were developed by the Medical Research Council (MRC). The MRC guidelines were designed to protect laboratory workers and prevent accidental release of r-DNA organisms, but were expanded in 1978 to include protection from other infectious agents. In 1986 the MRC announced that the guidelines were being reviewed, and called for public comment.

5. Regulations

One of the major factors that will influence the extent and nature of commercial development is the nature of regulations.

The issues that need to be considered include:

1) whether or not existing legislation and regulations apply to biotechnology;
2) whether or not there are new or additional risks posed by biotechnology which require additional or separate regulation.

The MRC guidelines referred to above are only guidelines (not regulations) and were designed for research operations, for the protection of laboratory workers and the prevention of accidental release. However, with the commercial development of biotechnology the problems and risks will change: large scale production will involve different processing techniques and facilities; there will be engineering problems to solve; containment strategies will change; the workers involved will probably have less knowledge of the processes and consequences than research workers; and the applications will involve many sectors, e.g. miners using recombinant bacteria for mineral leaching, farmers applying microbial fertilizers and pesticides; and sewage and pollution control workers dealing with disposal.

The need for a policy and regulations for biotechnology and the need for consistency and co-ordination have been stressed by the National Biotechnology Advisory Committee.[10] However, it would appear (see Appendix I) that, at this time, neither a policy nor any major initiatives for biotechnology is forthcoming from either the federal or the provincial governments.

ANALYSIS

The Need for a Policy

From this brief introduction it appears that:

1) there is enormous potential for the applications of biotechnology to many sectors of the economy;
2) the applications of biotechnology will result in products, processes and agents that in many cases, are (or will be) similar to products, processes and agents already in use;
3) the Canadian and Ontario governments have committed significant amounts of money to promote the industrial development of biotechnology;
4) there is the potential for a large number of workers in different sectors to be involved with biotechnology;
5) potential hazards exist and the degree of risk is not insignificant.

From a study of the Regulation of Modern Biotechnology[11] (see Page 5, Appendix I) it appears that there is already a network of jurisdictional responsibilities and an extensive regulatory framework for the regulation of products, processes and agents that can be applied to biotechnology. So, the important question becomes should biotechnology (the products, processes and agents of) be regulated separately or differently from other technologies (and their products, processes and agents).

The answer to this question depends largely on whether there are additional or new risks associated with biotechnology and whether the existing legislation and regulations can deal with them.

Council recognizes that an analysis of biotechnology and its applications to determine the potential for new or additional risks is a very complex task fraught with much uncertainty and many unknowns. However, biotechnology offers governments a challenge; an opportunity to guide the development of a potentially hazardous technology in a way that avoids the 'after-the-fact emergency approach' to problems.

In order to determine the best approach to protecting the health and safety of Ontario workers involved with biotechnology, council recommends:

ACOHOS RECOMMENDATION 87-1

that the Minister of Labour take immediate steps to ensure that an agenda for action on biotechnology be developed for the Ministry of Labour.

While stressing the immediate need for an agenda for action, council recognizes that policies and long-term plans take time to develop, especially when the field is new; the science is advancing rapidly; there are many unknowns and great uncertainty; and the issue of jurisdictional responsibilities is complex. Added to these considerations council believes that the process of developing a policy should be open and should allow time for consultation and debate. Therefore, it is essential that a mechanism be in place to deal with issues that may arise in the interim.

As noted earlier, there is a wide range of policies, regulations and guidelines that can be applied to biotechnological products, processes and agents. The policy instrument presently available to the Ontario Minister of Labour for the protection of worker health and safety is the *Occupational Health and Safety Act* (1978).

The *Occupational Health and Safety Act* contains sections requiring employers to provide information, instruction and supervision to a worker to protect the health and safety of the worker, [Section 14 (2)(*a*)]; and take every precaution reasonable in the circumstances for the protection of a worker [Section 14(2)(*g*)]. If a substance (including biological agents) is, in the opinion of a director, likely to endanger the health of a worker, the director can order that the use, intended use or presence be prohibited, limited or controlled as specified by the director (Section 20). There is also the requirement that, *except for purposes of research and development*, no person shall manufacture, distribute or supply a new biological or chemical agent unless he notifies a director in writing of his intention. The notice should include the ingredients of such new agent or combination of agents and their common or generic name(s) and the composition and properties (Section 21). If, in the opinion of the director, the introduction of the agent may endanger the health and safety of the worker, the director can require the notifier to provide 'a report of assessment' of the agent made by an expert (with qualifications specified by the director) [Section 21(2)] that could include the toxicological effect, the effect of exposure, etc. [Section 28(1)(*l*)].

With these general requirements already in legislation, council recommends:

ACOHOS RECOMMENDATION 87-2

that, in the interim, the Minister of Labour ensure that the present legislation and regulations be used and that:

1. the present review procedure for new chemicals and biological agents is adequate and appropriate for agents, products and processes of biotechnology;
2. there is the requirement to notify the government of all agents, products and processes classified as potentially hazardous according to existing guidelines. Such notification should include data submission and the requirement for government approval for work at the various stages of the life cycle of the agents, products or processes;

3. agents, products or processes for the purposes of research or those used in small quantities are not exempt from the notification/data submission/approval step when the agents, products or processes are classified as potential hazards according to existing guidelines.

In order to apply the present legislation (and/or to develop new policies, procedures or guidelines) for biotechnology, it is necessary to determine:

- what is or should be classified as 'new' (and, hence, needs notification under Section 21 of the Act);
- what test-data will be required to aid the ministry in determining whether the agent, product or process is likely to pose a hazard;
- whether or not the means of assessing the degree of hazard in the present review procedure is adequate (recognizing the potential for biological agents to multiply and spread in the environment);
- a classification scheme based on potential hazard. (The classification scheme should then serve as a basis for the determination of the extent and types of control required. The need for and basis of a classification scheme is discussed later in the document).

Process of Developing a Policy

Council considers it essential that the process of developing a policy be open and provide the opportunity for public input and debate.

In order to develop a policy that is practical and acceptable, the stakeholders should be involved in the process. The consequences of neglecting the public, especially the affected parties (which, potentially, extend to the public), will tend to increase the uncertainties and concerns and could lead to a reaction similar to the negative reaction to the development of the nuclear industry.

ACOHOS RECOMMENDATION 87-3

> that the Minister of Labour ensure that the mechanism for developing a policy includes the opportunity for public participation and the consideration of input from interested and affected parties.

Key Elements of a Policy

In many jurisdictions, including Canada, there has been a plea from industry for a policy to specify the principles that will guide any legislation or guidelines, to clarify what will be regulated, the standards to be applied and the agencies/departments responsible for review and approval. Industry has also stressed the importance of regulations being based on scientific evidence of risk.

Council has recommended that the process of developing the policy be open and involve the stakeholders so that issues can be debated; for example — whether the regulations should be based on control of situations where there is scientific evidence of risk or on containment and prevention of exposure where there is uncertainty or potential for hazard.

However, there are some basic elements that need to be addressed in a policy and these should serve as an agenda for discussion with affected parties. These include:

1) The purpose of the policy, i.e.

   - to define the goal,

     e.g. protection of the health and safety of workers dealing with biotechnology;

   - to identify the jurisdictional responsibilities,

     e.g. the Minister of Labour should consider all aspects of his responsibilities throughout the life cycle of the products, processes and agents, i.e. the protection of the health of workers in research, development, manufacturing, transportation, use (e.g. farmers using pesticides; miners using bacterial leaching), as well as considering the effects of the biological processes on structures that could affect the safety of workers, etc. and disposal.

     Recognizing that different jurisdictions will, or should, be developing policies and that there could be some overlap, it is essential that, as far as possible, policies be consistent with, and co-ordinated with, the policies of other jurisdictions. This issue of co-ordination will be discussed in more detail in a later section of the document.

2) The definition of biotechnology. A definition will need to be designed for legal purposes to suit the needs of the Ministry of Labour and serve as the basis for the interpretation of legislation and regulations, i.e. clearly identifying what will and will not be included in the policy, e.g. whether 'old' biotechnological processes like fermentation and brewing will be included, or whether it will be restricted to 'new' biotechnology, recombinant DNA technology, or genetic engineering, etc.

3) A classification scheme. The purpose of a classification scheme is to determine the products, processes or agents that should be controlled or regulated. As the purpose for controlling or regulating biotechnology is to protect health and the environment from adverse effects resulting from the application of biotechnology, the classification scheme should be based on the magnitude of, or potential for, risk.

   The estimation of risk is usually based on an analysis of past experience. However, with new technologies there is little, if any, experience, and, in many cases, the nature of the effect cannot be anticipated. This is the reason that the guidelines developed by the National Institute of Health (in the United States), the Medical

Research Council (in Canada) and the Genetic Manipulation Advisory Group (in the United Kingdom) are based on grouping organisms or processes into several broad categories according to the anticipated potential for risk. Biological and physical containment requirements are specified for each category as are guidelines for handling and use.

The determination of a classification scheme will be the most important and difficult task in developing a regulatory framework. However, it should not delay the development of a policy. Initially, the policy need only contain the principles of classification, i.e. that all biotechnological products, processes and agents will be classified according to the likelihood and degree of risk to health and the environment; that the requirements for notification, testing, review, approval, as well as the control-specifications and guidelines for handling and use, will depend upon the category (or class) into which the product, process or agent is classified. The policy will also need to address how such a classification scheme should be determined, i.e. whether the existing schemes (used in the NIH or MRC guidelines) should be reviewed and used as a basis or whether risk assessments should be performed. It would appear to be most practical to determine the major categories in generic terms using an approach similar to that proposed for use in the United States. Criteria for categorization could be, for example, manipulations of pathogens, manipulation of non-pathogens, or intergeneric transfer of DNA, with sub-categories depending on whether the DNA contains only non-coding regulatory regions or not.[12] Such a classification would be according to anticipated potential for risk. Specific risk assessments would be reserved for the testing and notification stage and only for the more hazardous categories.

4) The need for a review procedure. This will be addressed or it will be a corollory of the classification, i.e. the need for notification, approval and the extent of testing required should be determined according to the major categories identified in the classification scheme. In the cases where notification and testing are required, there will be the need, within government, for an effective procedure to review the data submitted and to determine whether the development, manufacture or use of the agent, process or product should be approved. This could be done within individual government departments, by an interdepartmental committee or by an external panel of experts.

5) Whether the existing legislation should serve as the basis for dealing with biotechnology or whether new legislation should be developed. This issue will be a key element of the policy and will clarify the nature and direction of the legislative framework. This is the information that industry requires in order to determine which areas to pursue and what will be expected of it. This issue has been addressed and resolved in other jurisdictions and is being considered by the federal government (see Appendix I). The Organization for Economic Co-operation and Development concluded that: 'There is no scientific basis for specific legislation to regulate the use of recombinant DNA organisms.'[7]

The approach proposed for the United States[12] is that existing statutes provide a basic network of agency jurisdiction over both research and products and that this network form the basis of the co-ordinated framework and help assure reasonable safeguards for the public. Then it becomes the responsibility of each agency to determine the adequacy of its own statutes to deal with the particular aspects of biotechnology under its jurisdiction.

An issue of prime importance in determining whether the existing legislation should serve as a basis for the control of biotechnology is whether all aspects and sectors are included under the present legislation. For example, at present, the agricultural sector is exempt from the *Occupational Health and Safety Act*; therefore, if the Act were considered to be the basis for a legislative framework to deal with the protection of workers from products, processes and agents of biotechnology, the protection of farmers and farm-workers from any adverse effects of pesticides or other products, processes or agents of biotechnology would not be provided for. Another example that should be carefully reviewed is the exemption from the requirement (in section 21) to notify the director of a chemical or biological agent if it is used, manufactured or imported for the purposes of research and development. (This issue was noted earlier in the discussion of the actions required 'in the interim'.)

6) A mechanism to ensure ongoing communication with other jurisdictions, the scientific community and the public. The issue of the need for co-ordination with other ministries and government departments is discussed elsewhere. It is essential that communication is ongoing and that it is ensured in the policy. Similarly, there has been discussion of the need for communication with public and affected parties for the purposes of developing the policy. However, it is important that this communication also be ongoing so that the public is kept informed of scientific developments and applications, where and how they will be used and the testing and safeguards that are in place. At the same time, it is important to maintain a flexible policy that is sensitive to the needs of the public. If biotechnology is to be effectively utilized the policy must be in synchrony with public perception. One of the recommendations of the OECD was 'that member countries make special efforts to improve public understanding of the various aspects of recombinant DNA techniques.'[7] It is also essential that there is a provision for ongoing communication with the scientific community. With a science that is developing as rapidly as biotechnology, new techniques and new applications are going to be discovered, and the techniques and applications will need to be reviewed for their potential impact. Policies, guidelines and regulations will have to be flexible and frequently reviewed.

7) A mechanism to protect confidentiality of information. With any system that requires notification of new products, processes or agents and the submission of test data and information on the nature, properties and ingredients of the products, there needs to be a mechanism to protect

the confidentiality of the information for trade secret protection. Depending upon the state of the patent laws at the time, this issue may be crucial for companies in determining whether to invest in the development of biotechnology in Canada/Ontario.

The OECD recommended 'that member countries ensure that assessment and review procedures protect intellectual property and confidentiality interests in applications for recombinant DNA, recognizing the need for innovation while still ensuring that all necessary information is made available to assess safety.'

ACOHOS RECOMMENDATION 87-4

that, in developing a policy for the Ministry of Labour, the following issues be considered and addressed:

1. the purpose of the policy;
2. the definition and scope of biotechnology and related terms for the purposes of the policy;
3. the need for a classification scheme to determine what should and should not be included in the policy and to categorize, according to potential hazard, the various levels of concern/regulation/control;
4. the need for a review procedure to be used by the ministry for identifying and assessing the potential for harm;
5. whether the existing legislation should serve as the basis for dealing with biotechnology or whether new legislation should be developed;
6. the need for a mechanism to ensure ongoing communication with:
    a) scientific experts
    b) other jurisdictions
    c) the public;
7. a mechanism to protect confidentiality of information.

The Need for Expertise and Training of Personnel

Another important aspect of an agenda for action and long-term planning will be the assessment of the expertise and resources that the ministry has, or has available to it, to deal with the issues arising from the impact of biotechnology.

Although the issues of expertise and training of personnel should also be dealt with in the policy and the long-term plan, expertise will be required to develop a policy. There will be an initial stage of developing the policy which will require expertise external to the ministry to advise and/or work in collaboration with the minister/ministry.

ACOHOS RECOMMENDATION 87-5

> that the Minister of Labour ensure that there is sufficient expertise in the ministry, or available to the ministry as a resource, to support and perform the functions described in ACOHOS Recommendations 87-1 to 4, 6 and 7.

The inspectors dealing with workplaces where biotechnology or its products, processes or agents are being used will also need specialized training. Inspectors with the required training will enhance communication with affected parties, and be able to assess present practices and the adequacy and use of existing guidelines. All this information will be useful for the development of policy as well as to ensure that the present legislation is being interpreted and implemented.

ACOHOS RECOMMENDATION 87-6

> that the Minister of Labour take steps to ensure that inspectors visiting establishments that are undertaking work in biotechnology receive specific training in biotechnology and the associated potential for hazards.

Life Cycle Approach and Co-ordination with Other Jurisdictions

Council considered a number of the policy elements in detail, especially the life cycle approach to policy development. As stated earlier, in order to protect health and the environment there needs to be consideration of the risk at every stage of the life cycle, i.e. from the origin in the research laboratory, through development, pilot plant, scale-up, production, distribution, transportation and use, right through to disposal.

If the agents, products and processes are considered to be similar to existing products, processes and agents, the responsibility for each stage would lie with different ministries and/or departments of the federal and/or the provincial governments. There is legislation/regulations and/or guidelines already in place to deal with various stages, for example:

Research	- MRC Guidelines - Good Laboratory Practice
Development	- Good Laboratory Practice
Manufacturing	- Good Manufacturing Practice - Occupational Health and Safety Legislation
Transportation	- Transportation of Dangerous Goods
Use	- Hazardous Products Act - Food and Drug Legislation - Legislation for Pesticide Approval and Use
Disposal	- Environmental Contaminants Act

etc.

The legislation and jurisdictional responsibility will vary according to the nature and use of the product, i.e. if the product of biotechnology is human insulin, its transportation, use and disposal would be the same as that for human insulin, synthesized or extracted by other techniques. Similarly, it would be expected that a genetically engineered organism used as a pesticide would be covered by legislation on pesticides, but that the testing required could be different. The safety of workers using biotechnological processes would be expected to be under the same jurisdiction/legislation as protection of workers from other occupational hazards.

Council stresses the importance of assessing all aspects of biotechnology to ensure that there are no gaps in the system caused by the lack of definition of jurisdictional responsibilities. It is clear that the overall assessment should be performed by the lead agency with the responsibility for co-ordinating activities in biotechnology policy development. However, the Minister of State for Science and Technology (MOSST) does not have any legislative responsibility or authority; therefore, it will be the responsibility of each ministry and department to: assess the impact of biotechnology on its area of responsibility; to ensure that the policy it develops is co-ordinated and consistent with the overall policy; and to assess the fringe areas where there is the potential for gaps or overlaps with other jurisdictions. Each department should have the responsibility to communicate and, if necessary, collaborate within these areas in order to co-ordinate the policy/legislative framework.

ACOHOS RECOMMENDATION 87-7

that the Minister of Labour take steps to promote, within government, the development of policies to deal with biotechnology, i.e. products, processes and agents through all stages of their life cycle from research and development through use to disposal, and to initiate a mechanism for co-ordinating the policies between provincial ministries and federal departments.

References

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3 *Task Force on Biotechnology*. Membership and Terms of Reference for the task force appended as Appendix II.

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6 *1986 Canadian Biotechnology Sourcebook: Commercial Organizations Involved in Biotechnology Research, Development or Manufacturing*. National Biotechnology Advisory Committee.

7 *Recombinant DNA Safety Considerations: Safety Considerations for Industrial, Agricultural and Environmental Applications of Organisms Derived by Recombinant DNA Techniques*. Organization for Economic Co-operation and Development, 1986.

8 *Health Impact of Biotechnology: Report on a WHO Working Group*. World Health Organization, Regional Office for Europe, Copenhagen, 1984.

9 Slovic, P., Perception of Risk. *Science*, Volume 236, pp. 280-285. April 1987.

10 Dr. Evans' address to the Second NRC Industrial Biotechnology Conference held December 4-5, 1986 in Montreal, Canada.

11 *The Co-ordinated Study on Government Processes in Safety and Regulation of Modern Biotechnology: A Report in Two Volumes to the Interdepartmental Committee on Biotechnology*, prepared by D. Henley, E.P.S., Environment Canada.

12 *Federal Register*, Volume 51, No. 123, June 26, 1986. Notices.

13 *International Health and Safety Regulation of Biotechnology: A Comparison between the European Communities, the United Kingdom, France, the Federal Republic of Germany, Switzerland and Japan, and the United States prepared for the U.S. Congress* — The Office of Technology Assessment 1983.

APPENDIX I*

Federal Government Activities

In 1983 the Minister of State for Science and Technology announced a biotechnology strategy for Canada. The goals of the strategy were to enhance scientific research and industrial applications, encourage skilled human resource development, increase scientific co-operation and technology transfer and foster an economic and regulatory climate conducive to commercial biotechnology investment and activities.

The strategy provided for a series of related activities including:

- the formation of the National Biotechnology Advisory Committee to advise the minister on biotechnology in Canada and to monitor the strategy;
- the establishment of a set of biotechnology R&D networks to foster links between the performers and users of research;
- the Program for Industry/Laboratory Projects (PILP) Biotechnology. A cost-sharing program designed to support industry projects that involve collaborations and sub-contracts with universities or provincial research organizations; and
- the formation of a Federal Interdepartmental Committee to provide a forum for discussion of the federal government responsibilities under the national strategy.

To gather more information on the biotechnology activities in Canada, MOSST conducted a number of surveys. From the surveys it was concluded that biotechnology had been identified by all provincial and territorial governments as a subject warranting attention. The approaches taken by the various provinces varied, as did the ministries responsible; however, the main thrust in each jurisdiction was found to be towards encouraging the development of biotechnology-related industries that will benefit the economy.

The federal government has committed $11 million per year to support the biotechnology strategy and a total of over $100 million for various activities associated with biotechnology. These include a cost-sharing support program for industrial research and development (R&D) carried out in collaboration with universities or provincial research centres, the provision of funds to government departments to strengthen their in-house biotechnology R&D capability and encourage collaboration with researchers in other sectors, increased grants and scholarship programs and the establishment of a number of research chairs supported jointly by the National Science and Engineering Research Council (NSERC) and private companies.

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* For footnotes cited herein, see Reference Section.

Ontario Government Activities

Ontario has recently made moves to recognize biotechnology officially, and it is committed to encouraging the development of industrial applications of biotechnology. The Ontario government (through the Ontario Development Corporation) in a joint venture with industry and the Canada Development Corporation (CDC) made a large commitment of funds in the formation of Allelix, one of Canada's major biotechnology companies. The government has a 20 per cent equity interest in the firm and has committed $18 million for research operations over 10 years and a capital loan of $15 million to construct the research facilities. However, it has been indicated that further funding and activity in biotechnology should be from the private sector.

The Ontario government does not have a specific biotechnology policy. Activity in the province is spread throughout a range of departments and is funded directly from departmental budgets. There is a person assigned to co-ordinate the biotechnology activities in the province, but there is no lead agency and no time or resources assigned to the co-ordination or development of policy.

Co-ordination and the Need for Regulation

As noted earlier, MOSST conducted several surveys and published three reports[4] [5] [6] to help foster better communications and co-operation within the biotechnology community. It was also hoped that the information would be useful in planning mutually supportive initiatives by the federal and provincial governments and in encouraging investment and commercial development. The National Biotechnology Advisory Committee (NBAC) was set up to monitor the biotechnology strategy and to provide the Minister of State for Science and Technology with policy advice. The committee has representives from industry, university and federal government departments. The committee meets annually with representatives of the provinces.

The NBAC undertook an analysis of the factors necessary to move biotechnology from the research laboratory to the marketplace. One of the most important recommendations was the need to clarify regulatory requirements for products and processes derived from biotechnology.

Dr. John Evans, chairman of NBAC and president of Allelix, addressing the National Research Council (NRC) conference on biotechnology,[10] that stated 'the need (for regulation) is urgent now that products are close to market. Even at the earlier stage of R&D, regulation can be decisive by affecting primary considerations such as cost, time to market and uncertainty.' He went on to stress that regulations should be designed to protect the public and the environment from unreasonable risk and should follow closely the approach to regulation adopted by Canada's neighbours and major trading partners. He pointed out that a major deviation from this approach might place scientists and the biotechnology industry in Canada at a competitive disadvantage.

Because of the tremendous advantages to Canada, in terms of scientific and economic development, the MOSST initiative and the NBAC have stressed the need to create a climate for the successful industrialization of biotechnology. The emphasis has been on communication, co-operation and collaboration between the governments (federal and provincial) government departments, industry and universities.

It would appear, from the mandate of MOSST, that a policy developed for Canada would be designed to foster the growth of the biotechnology industry. The other aspect of the policy alluded to by Dr. Evans, i.e. the protection of the public and the environment from unreasonable risk, does not, at present, seem to feature as a high priority in the strategy.

Government Activities Towards Policy Development and Regulations

The interdepartmental committee was formed to co-ordinate national strategy activities, including the regulatory aspects. As a result of this activity, MOSST has been directed to review regulatory issues and, accordingly, has been examining patenting and safety issues. The 'Co-ordinated Study on Government Processes in Safety and Regulation of Modern Biotechnology'[11] was undertaken to 'better understand the relevance and capacity of existing and proposed regulatory structures to address modern biotechnology products and processes.' Sixty nine federal and provincial departments having responsibilities for occupational health and safety, public health and environmental protection participated in the study.

The study relied on the respondents from the various departments to identify and review the legislation, regulatory guidelines, review processes and other policy instruments that are administered by their department, and that may affect biotechnology. The respondents were requested to review how each policy instrument might be applied. However, with the broad potential for the applications of biotechnology and the complex scientific nature of the agents, products and processes it is unclear whether all aspects of biotechnology were anticipated or covered in the review.

It is obvious, both from the number of departments reviewed (17 federal departments and five in the province of Ontario) and the 65 policy instruments administered by these departments, that there is a large (cumbersome) network of regulations already in place that may or may not deal with the various aspects of biotechnology.

The decision of whether existing legislation does or does not apply depends partly on the definition of biotechnology and partly on whether the risks associated with biotechnology are similar to or different from the risks associated with other technologies. Dr. Evans[9] noted that 'Since 17 federal agencies and (a number of) departments in each of the provinces are involved, a co-ordinated approach to regulation is essential to minimize conflict, inconsistency and duplication.' He went on to suggest that 'the logical approach would appear to be regulatory control based upon the existing agencies and legislation supplemented by a co-ordination and oversight mechanism to identify and evaluate any new risk factors'.

A number of federal departments and provincial ministries have recognized the need to review their policy instruments and to assess the adequacy of the existing legislation to cover biotechnology. Environment Canada has identified biotechnology as an issue for public comment during its 'hearings' on the proposed amendments to the *Environmental Protection Act*. Other departments (Agriculture and Health and Welfare) are assessing testing and data requirements for determining the potential for risk from biotechnology (products, processes and agents). Consultants have been hired by a number of departments and ministries to gather information and to advise on policy direction.

Activities of Other Jurisdictions and International Organizations

Canada's major trading partners have invested heavily in biotechnology, and both the United States and Japan have made very significant progress in many fields.

Many countries have recognized the need for policy and regulations/guidelines to deal with biotechnology. The approach taken by the various governments tends to reflect the state of development of biotechnology and the political structure and climate of the country. This is well illustrated in a study done for the U.S. Congress — The Office of Technology Assessment — *International Health and Safety Regulation of Biotechnology: A comparison between the European Communities, the United Kingdom, France, the Federal Republic of Germany, Switzerland and Japan, and the United States.*[13] The report categorizes and compares the regulations and guidelines in each of the countries, under the following headings:

- Recombinant DNA Research Guidelines;
- Environmental Regulation;
- Regulation of Worker Health and Safety; and
- Regulation of Pharmaceuticals and Related Substances.

The purpose of the comparison was to identify for the Office of Technology Assessment (OTA) the aspects of biotechnology that require action (and/or regulation) in the United States.

In June 1986 The White House Science Office in the United States published a Notice, Request for Comments on Federal Policies for Regulation of Biotechnology Industry. The notice announced the policy of the federal agencies involved with the review of biotechnology research and products. It described the proposed co-ordinated framework for the regulation of biotechnology, the interagency co-ordination mechanisms, definitions and the individual policy statements for the Food and Drug Administration (FDA), the Environmental Protection Agency, (EPA), the Department of Agriculture, the Occupational Safety and Health Administration (OSHA) and the National Institutes of Health (NIH). Although the policies were published with the request for public comment, they were to take effect at the time of publication (June 1986). The overriding theme of the policies was that existing statutes provide a basic network of agency jurisdiction over both research and products and that the network form the basis of the co-ordinated framework and help assure reasonable safeguards for the public. However, in a few instances (certain microbial products), additional regulatory requirements, available under existing statutory authority, needed to be established.

These instances, along with an outline of the framework, are described in the Notice.[12]

The Organization for Economic Co-operation and Development (OECD) recently published a lengthy document on 'Safety considerations for industrial, agricultural and environmental applications of organisms derived by recombinant DNA techniques'.[7]

The conclusions of the group included that:

1. there is no scientific basis to justify introducing specific legislation to control r-DNA;
2. oversight and review mechanisms should be established in conjunction with existing regulatory legislation rather than as a separate apparatus;
3. notification may be an appropriate requirement in some situations;
4. use of low-risk organisms and good large-scale industrial practice should be encouraged;
5. controlled scale-up through growth chambers to greenhouse level and subsequently to small-scale open environment is a logical mechanism for reducing risk through staged experience;
6. good public communication is an essential companion piece to regulatory policy.

It is interesting to note that most countries have already adopted r-DNA guidelines to complement existing laws.

Recombinant DNA Guidelines

Due to the concern expressed by some scientists about the potential for public health risks associated with genetic engineering, an international conference was held in Asilomar, California, U.S.A. in 1975. The discussion focused on safeguarding the public and the environment from laboratory accidents. The report of the conference led to the formation of the Recombinant DNA Advisory Committee (RAC) in the United States and the formulation of the National Institutes of Health, (NIH) guidelines for DNA research. The guidelines include biological and physical containment standards that were assigned to experiments based on their estimated risks. With increased understanding of the technology and a good 'track record', containment requirements were relaxed in 1982. The NIH guidelines have been the main source of reference for laboratory safety, and many other countries have followed the United States' model.

In England the Genetic Manipulation Advisory Group (GMAG) has also established voluntary guidelines. However, notification is mandatory for experiments involving plant pests, and permission of the Health and Safety Executive is required for field tests.

In Canada guidelines similar to those of the NIH were developed by the Medical Research Council (MRC). The MRC guidelines were designed for the protection of laboratory workers and the prevention of accidental release of r-DNA organisms but were expanded in 1978 to include protection from other infectious agents. In 1986 the MRC announced that the guidelines were being reviewed, and it has called for public comment.

APPENDIX II

TASK FORCE ON BIOTECHNOLOGY

Terms of Reference:

1. To review concerns associated with biotechnology.
2. To review policies and regulations designed for, or applying to, biotechnology in other jurisdictions.
3. To review the adequacy of current Ontario regulations to protect the health and safety of workers in each stage of the life cycle of biotechnological processes or products.
4. To make recommendations to ensure adequate protection of workers in biotechnology in Ontario.

Membership:

Council:

R.T. Boldt (chairman)
D.R. McCalla
G.M. Nipshagen
C.J. Tuohy
D. Ublansky

Others:

D. Burke — Allelix Inc., Mississauga

P. Tocher — Connaught Laboratories (Energy & Chemical Workers' Union, Local 67), Willowdale

Advisory Council on
Occupational Health &
Occupational Safety
Ontario

Conseil consultatif
de la santé et de la
sécurité au travail

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400 University Avenue
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416/965-2448

March 18, 1988

The Honourable Gregory Sorbara
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Sorbara:

I am writing on behalf of council to request the release of council's Advisory Memorandum 87-I on Biotechnology.

Council is aware of a number of initiatives being undertaken by the federal government with respect to the development of a strategy for dealing with the products and processes of biotechnology.

Council considers that Advisory Memorandum 87-I contained information and recommendations that could be of value to the federal government and parties during the development of such strategies and regulations.

At a recent council meeting there was discussion about the status of policy development for biotechnology in Ontario, and council asked me to stress the importance of Ontario being involved, if not leading the way, in a co-ordinated effort to develop policies for this important rapidly developing technology.

I would be glad to talk to you about this matter if you think it would be useful.

Yours truly,

D.R. McCalla
Chairman

c.c: G. Thompson
T. Millard

Note: The minister's response to Advisory Memorandum 87-I, dated May 18, 1988, and a letter dated May 31, confirming that the advisory memorandum and the minister's response may be released, are available for distribution but were received too late for inclusion in this annual report.

Advisory Memorandum 87-II

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

Office of the
Chairman

Bureau du
président

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-2448

August 26, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

On behalf of council I am pleased to submit Advisory Memorandum 87-II containing council's comments on the process which led to the development of the amendment to the Regulation respecting Mercury (Ontario Regulation 141/82).

We hope that these comments will be useful to you.

Yours truly,

DR McCalla

D. R. McCalla
Chairman

cc: G. Thompson
: T. Millard
: A. Gladstone
: A.E. Robinson

Advisory Memorandum 87-II to the Minister of Labour August 26, 1987

A Review of the Process Leading to the Proposed Amendment to the Regulation Respecting Mercury.

INTRODUCTION

The process used by the ministry to develop designated substance regulations has become relatively standardized and consists of various defined stages that provide opportunity for public input.

When the first proposed regulations were published in August 1980, the Construction Safety Association of Ontario (CSAO) responded that many of the requirements would be impractical for construction. It suggested that, due to the transient nature of the industry and the difficulties involved in implemeting some of the provisions, a procedural regulation would be more effective for construction. After that time, the construction industry was exempted from designated substance regulations on the understanding that designated substance regulations based on a control-by-procedure approach would be developed for construction operations.

The CSAO has developed and submitted to the ministry draft regulations for several of the substances already designated in other sectors. In the case of asbestos, lead and silica, the ministry has then proceeded to develop the regulations, using much the same process as it uses for developing the other designated substance regulations. This process has included submitting the proposed regulation to council to review the process.

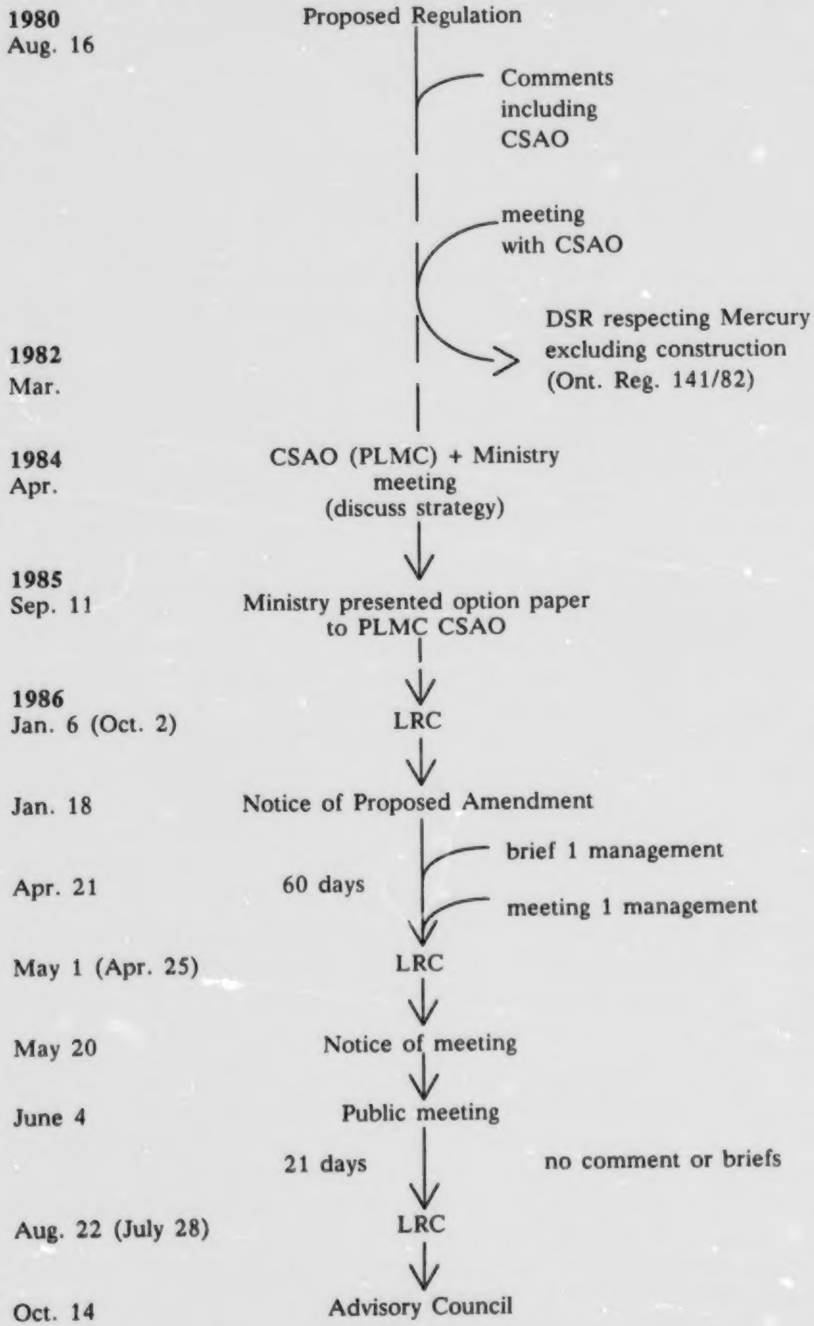
BACKGROUND

Mercury was one of the first substances identified as needing control by designation. The designated substance Regulation respecting Mercury (Ontario Regulation 141/82), which was promulgated in March 1982, like all the other designated substance regulations (before and since), contained an exemption for construction.

However, unlike other substances considered for control in construction, a separate regulation for mercury was not developed. Following consultations between the ministry and the CSAO and representatives of labour and management from the construction trades, it was considered that the control of mercury in construction could be dealt with by amending Ontario Regulation 141/82 and developing guidelines. Once this determination was made, the process used by the ministry to proceed with the amendment followed the same basic format as the development of designated substance regulations, and is schematically presented in Figure 1 below.

Figure 1

PROCESS RESULTING IN THE DEVELOPMENT OF THE PROPOSED AMENDMENT TO THE DESIGNATED SUBSTANCE REGULATION RESPECTING MERCURY


1980
Aug. 16
Proposed Regulation
Comments including CSAO
meeting with CSAO
1982
Mar.
DSR respecting Mercury excluding construction (Ont. Reg. 141/82)
1984
Apr.
CSAO (PLMC) + Ministry meeting (discuss strategy)
1985
Sep. 11
Ministry presented option paper to PLMC CSAO
1986
Jan. 6 (Oct. 2)
LRC
Jan. 18
Notice of Proposed Amendment
brief 1 management
Apr. 21
60 days
meeting 1 management
May 1 (Apr. 25)
LRC
May 20
Notice of meeting
June 4
Public meeting
21 days
no comment or briefs
Aug. 22 (July 28)
LRC
Oct. 14
Advisory Council

The Notice of the proposed amendment was published in January 1986 and was followed by a 60-day comment period, during which one brief was submitted and one meeting was convened. There was a Notice of a public meeting, followed by a public meeting and a 21-day comment period, during which no comments were received. In October 1986 the proposed amendment and background material were submitted to council. The task force established by council to review the process met with ministry personnel to gain clarification on several issues. The agenda for discussion is included as Appendix I, and the responses and discussion of the issues constitute Appendix II. Council's review focused on the same three aspects of the process as did its reviews of other designated substance regulations, i.e. analysis of background documentation, the consultative process, and application. However, due to the different outcome of the process, i.e. an amendment rather than a regulation, the emphasis was different and included consideration of the means of determining which substances should be regulated and the strategy to be used.

ANALYSIS OF BACKGROUND DOCUMENTATION

Council's review of the ministry's process of assembling, reviewing and analysing the background information usually focuses on the analysis of the health effects data, the extent of use, current means of control and the potential for hazard to the health of workers in Ontario.

Health effects data on mercury were assembled and analysed during the development of Regulation 141/82, and council reviewed the ministry's analysis in 1981 (see Reference 1). From the background documentation presented to council with the proposed amendment[2] and from discussions with ministry personnel (see Appendix II), it appears that the health effects data had not been re-evaluated specifically for the purposes of the amendment. However, it was pointed out that the ministry examines information as it becomes available and periodically assesses whether there is sufficient new data to warrant a re-evaluation.

The ministry, in collaboration with the CSAO, sought information on use(s) of mercury in construction — including the potential for exposure in demolition, maintenance or reconstruction of sites where mercury is present. Mercury is not used in construction, and, from the background information provided to council,[2] it appears that the potential for hazard to construction workers was considered to be significant only for workers performing demolition or renovation in chlor-alkali plants, and, potentially, in accidents, spills, etc.

Other operations with the potential for construction workers to be exposed to mercury include:

- demolition or renovation of buildings other than chlor-alkali plants where mercury had been used (From the background document,[2] this was not considered to be of significant concern.);

- maintenance and/or renovation of buildings where mercury is being used.

The issues of the protection of contract workers and notification of constructors carrying on such projects at establishments where a designated substance regulation applies are generic concerns that council believes should be considered.

In the Notice of the proposed amendment, the ministry noted that it had 'limited information on exposure of workers to mercury during construction work'[3] and it requested comments, suggestions and information on a number of topics. It appears that the only response was from the company operating the only chlor-alkali plant in the province.

It was on the basis of the information assembled that the decision was made to amend Regulation 141/82 rather than develop a separate regulation. The process of making this decision will be discussed in the next section (consultative process).

CONSULTATIVE PROCESS

As mentioned earlier, the process for developing construction regulations has been slightly different from the process used to develop other designated substance regulations. It is unclear from the background information why mercury was considered a priority for control in construction. In response to a question from the task force about this issue, it appeared that, because mercury had been regulated for workers in other sectors, the question of whether there were construction workers who needed to be protected was raised. As described earlier, the analysis of the available information indicated that the potential for hazard in construction was limited to:

- workers on projects at chlor-alkali plants; and
- accidents involving breakage or spills.

Council understands that, since mercury had been one of the first substances identified for control in the industrial sector and in response to the question 'does it constitute a hazard to construction workers', the background information was gathered. Once the information was analysed, it was apparent that a simple amendment to the existing designated substance regulation respecting mercury could deal with the few instances in which mercury could present a hazard to construction workers. However, this process raises several generic questions. Firstly, how priorities are determined and, when the background information indicates that a substance is not a high priority but that the few cases where it could be a hazard could be easily addressed, whether the process for that substance should be pursued ahead of other substances that may be more hazardous or hazardous to more workers. Secondly, how vigorously should the ministry seek information to confirm that the substance only presents a minor problem and how much time should be spent on making sure that the proposed solution is all-inclusive and comprehensive and should the process include consideration of whether there are alternative means that could include similar situations. These are questions that will be considered by council in a more generic context in the future.

Council commends the ministry for its attempts to seek information and involve the parties that could be affected. This process was illustrated in the Notice of Proposed Amendment.[3] Council recognizes the difficulties of collecting information in situations where the parties do not perceive a problem.

With respect to the process of making the decision on how to proceed, it appears that the ministry assembled and analysed the relevant information in consultation with the CSAO and discussed the various options with the CSAO and the Joint Labour-Management Committee. Hence, it appears that affected parties had ample opportunity to have input into the process.

APPLICATION

Council's review of the legal-technical process usually involves a review of whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion. In the case of the amendment, the review was limited to:

1) whether the amendment addresses the needs of the workers that are at risk of adverse health effects; and,
2) whether the requirements in the regulation can be applied to the workers that are included by the amendment.

According to the background information, it appears as though the only construction workers with the potential to be exposed to hazardous levels of mercury are those working on projects at chlor-alkali plants. With respect to the issue of practicality, it appears that the present operators of the only plant in Ontario are prepared to cover such workers in the control program established under Regulation 141/82 for their industrial workers.

In response to a question about the status of the guidelines for safe handling of equipment containing mercury, ministry personnel explained that the guidelines are being developed by the CSAO in consultation with the ministry (see Appendix II).

The exemption of construction from the designated substance Regulation respecting Mercury led council to consider how the general duty clauses could be used to provide for the protection of workers where there is exemption from regulation. It is of concern to council that, without specific requirements in legislation, the enforcement of the general duty clause appears to be difficult (see discussion of Question 7, Appendix II).

OTHER ISSUES

Council, in its review of the process leading to the proposed amendment for the designated substance Regulation respecting Mercury, was particularly interested in the approach taken. Most of the issues raised and discussed extend beyond mercury in construction and lead to generic questions regarding:

- the present means of determining priorities for designation;

- whether, once something is determined to be a 'non-issue', should a quick solution be pursued?, more information be sought to confirm that it is a 'non-issue'?, or, should it not be pursued because it is a low priority;
- the protection offered construction workers not covered by specific designated substance regulations;
- whether construction should automatically be exempt from performance regulations;
- whether options other than separate regulations for the control of hazardous substances in construction should be examined;
- whether council should, in its review, be considering the process of developing the guidelines that are considered part of a control strategy;
- whether the issue of accidents and emergency situations should be considered generically when determining strategies for controlling substances;
- the application of the existing designated substance regulations to contract workers and the protection afforded to these workers;
- whether there should be a requirement in all designated substance regulations that contractors/constructors be notified of the presence of the substance and the precautions, if any, that are being taken to control exposure.

Council plans to consider many of these issues in a more generic context in the future.

References

1. Advisory Memorandum 81-III: A Review by the Advisory Council of the Process Used to Develop a Standard for Mercury and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Mercury Exposure in the Workplace. *Advisory Council on Occupational Health and Occupational Safety, Fourth Annual Report, April 1, 1981 to March 31, 1982.*
2. The Report to the Advisory Council on Occupational Health and Occupational Safety on the Proposed Amendment to the Regulation Respecting Mercury for Control of Mercury Exposure in the Construction Industry, submitted by the Occupational Health and Safety Division, September 1986.
3. Notice of Proposed Amendment to the Regulation Respecting Mercury, Ontario Regulation 141/82, published in *The Ontario Gazette*, January 18, 1986.

APPENDIX I

Agenda for Discussion at the May 27, 1987 Meeting between Ministry Personnel and Members of the Task Force on Principles and Procedures for Setting Standards and Regulations (Subcommittee to Review the Process Used in the Development of the Proposed Amendment to the Mercury Regulation)

Questions

1) What was the process used to inform the public of the June 4, 1986 public meeting?
2) Did the list of interested members of the public include interested members of the public who submitted briefs in 1981?
3) What is the basis for the comment that "... interested members of the public have indicated support for the amendment to the mercury regulation and for the guidelines as the appropriate strategy to control mercury exposure in construction"?
4) What is the rationale for including creatinine correction in the Code for Medical Surveillance as opposed to specific gravity correction as suggested in C-I-L's April 28, 1986 letter?
5) The background information prepared for the mercury regulation (1981) indicated that a draft regulation specific for the construction industry was submitted by the CSAO. What happened to it? Was this a general regulation? Did it contain provisions specific to mercury?
6) What is the current status of the proposed guidelines for distribution to the construction industry on the safe handling of equipment containing mercury, including procedures to follow in the event of a spill? What is the nature of the guidelines?
7) Will there be need for amendments to the construction regulation?
8) Has there been a review since 1981 of data on the health effects of mercury?

APPENDIX II

Summary of the Responses to 'Issues for Discussion' at the Meeting Between Ministry Officials and Members of the Task Force on Principles and Procedures for Setting Standards and Regulations (Subcommittee to Review the Process used in the Development of the Proposed Amendment to the Mercury Regulation)

Questions 1 and 2

It was explained that the process used by the ministry to inform the public of the June 4, 1986 meeting and to invite public comments on the proposed amendment was similar to the process followed in dealing with a designated substance regulation and that Notices are mailed to interested parties approximately 30 days before the date of the public meeting.

Ministry personnel explained that the mailing list of interested parties included those parties who responded to the 1981 Notice of Intent to designate mercury.

It was clarified that, as with other notices about a public meeting, this one was not published in the press or gazetted, that the public meeting was open to the public and that the meeting was held to discuss the proposed amendment and provide opportunity for public views and comments.

Question 3

Ministry personnel explained that the statement was based on consultation with the CSAO and the Provincial Labour/Management Health and Safety Committee and the ministry's interpretation of the limited public response to the proposed amendment (one brief). The CSAO was consulted during the development of the control strategy and the Provincial Labour/Management Health and Safety Committee was advised of the background materials collected and of the strategy options discussed with the CSAO. Ministry personnel explained that there was virtually 'no comment' at the June 4, 1986 public meeting. It was clarified that the 'no comment' could be interpreted to mean that there was either very little interest in the proposed amendment or there was support for the particular kind of control strategy that was adopted.

In response to a question about the priority given to the amendment by the ministry and the construction industry, it was clarified that mercury was one of the substances on a list of substances prepared by the Provincial Labour/Management Health and Safety Committee for investigation. Ministry personnel explained that, because mercury is not a material used in the construction industry or found in the general working environment, there was little interest in the amendment from the committee.

Question 4

Ministry personnel explained that using creatinine correction to analyse urine for the presence of mercury was a more reliable method. Regarding the use of the specific gravity correction method, ministry personnel explained that a company could, under section 17 of the regulation, use another method of analysis if the method were equal to or better than the creatinine correction method outlined in the Code for Medical Surveillance.

It was clarified that, although companies were switching to the creatinine correction method, the one company that responded preferred to use specific gravity. The April 28, 1986 letter expressed the company's preference for using the specific gravity correction. This was because of the quicker turn-around time rather than an objection to the creatinine correction method.

Question 5

Ministry personnel acknowledged that the background information prepared on the proposed mercury regulation indicated that a draft regulation specific for the construction industry was submitted by the CSAO. It was clarified, however, that there was no record of a draft regulation received by the ministry but that the CSAO had submitted a major brief in response to the 1980 Notice of Intent to designate seven substances, including mercury. In the brief, the CSAO had argued that the draft regulations were not appropriate to the construction industry, and it recommended that procedural regulations be developed where warranted.

With regard to the proposed mercury regulation, the CSAO pointed out that it was not aware of any exposures in the construction industry and that the only likelihood of exposure might occur during the handling of broken mercury lamps, control instruments and electrical devices containing mercury. To deal with the rare instances where workers could be exposed, the CSAO had suggested that specific procedures be employed to handle safely the clean-up and disposal of mercury that may result from spillage or from the breakage of equipment. The specific procedures to be employed have been included in the guidelines being developed by the CSAO.

Question 6

It was explained that draft guidelines have been submitted to the ministry by the CSAO. Ministry personnel explained that the guidelines will relate to the maintenance and demolition of buildings and will describe the types and uses of mercury, the health hazards associated with exposure to mercury and safety precautions and clean-up procedures to follow for spilled mercury or mercury compounds. The guidelines will also provide instructions on how to handle and dispose of mercury vapour lamps and flourescent lamps that contain small amounts of mercury.

Responding to a question about what happens next with the guidelines, ministry personnel explained that the proposed guidelines will be reviewed with the Provincial Labour/Management Health and Safety Committee after revisions are made.

In response to a question regarding the distribution of the guidelines, ministry personnel indicated that the guidelines will be published and distributed within the construction industry and that the construction inspectorate would be briefed and advised of the guidelines and given appropriate training on how to react in situations where there is spillage or breakage of equipment containing mercury.

Question 7

Ministry personnel clarified that there was no need to amend the construction regulation.

In response to a question about the use of the general duty clause in instances where sectors are exempt from designated substance regulations, it was explained that there are sections in the 'sector' regulations that cover the protection of the worker against noxious gases and liquids, and the use of protective equipment.

As construction is exempted from Ontario Regulation 654/86 and designated substance regulations (unless specific procedural regulations are developed), there was a question about provisions for the protection of construction workers from airborne exposures to the substances listed in these regulations. This led to a brief discussion about situations where construction or contract workers could be exposed to mercury. It was pointed out that exposure measurements could only be used to advise the employers that there was a hazard, but could not be used as a basis for prosecution. There was a discussion about how a violation of the general duty clause could be determined and what could be used as a basis for a prosecution under section 14(2)(*g*) of the Act.

Ministry personnel pointed out that, based on advice from the Legal Services Branch, prosecution would require reference to a specific standard (regulation). There was a general discussion about the practice in other jurisdictions and the use and value of guidelines and the ALARA provision.

Responding to a question about whether there is a requirement to notify constructors/contractors of the presence of designated substances and of the control measures to be taken, ministry personnel explained that, except for the asbestos regulation, there were no provisions in any of the regulations that required a constructor to be informed of on-site toxic substances or of the measures required to protect workers from exposure. It was noted that such a provision was being addressed in proposed amendments to the *Occupational Health and Safety Act* (Bill 106, which has since died).

Question 8

It was explained that the health effects document had not been revised. However, it was noted that there is an ongoing review of the literature on each of the designated substances to determine whether there is enough new information to warrant a new health effects document. With respect to mercury, an area that is being reviewed with some interest is data on mercury amalgams — their presence in pregnant women and any effects that may be associated with their use by dentists in dental offices, etc. However, it was noted that, as far as workers are concerned, there were not enough data to warrant a new health effects document.

In response to a question about workers compensation data, it was explained that there had been very few claims and these were not enough to suggest a new hazard. It was indicated that if the situations had been looked after as they should have been, those problems would not have arisen.

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Labour

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September 22, 1987

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 11th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla,

Thank you for your letter of August 26, 1987, forwarding Advisory Memorandum 87-II, containing Council's review of the development process for the proposed amendment to the Regulation respecting Mercury. Council's careful and thorough review of proposed designated substance regulations and their amendments is most appreciated.

I note the numerous generic issues you have raised with respect to the designated substance regulations which extend beyond the context of the mercury amendment. I look forward to Council's considerations of these issues in the future.

I am pleased to note Council's commendation of my officials for their efforts in seeking information for and involving interested parties in the regulation- and amendment-making process.

Sincerely,

WILLIAM WRYE
Minister

Advisory Memorandum 87-III

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

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August 26, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

A task force of council conducted a detailed review of the proposed Regulation respecting Silica - Construction Projects and Aggregate Production and the background information accompanying the proposed regulation.

Owing to the ubiquitous nature of silica and the specific conditions under which it is likely to pose a hazard to workers, the application and approach to control are very complex issues. Council considered these issues at length and concluded that the proposed procedural regulation is not appropriate for the control of silica over the wide range of operations in construction and aggregate production.

The enclosed Advisory Memorandum (87-III) describes the review and council's analysis and comments on the issues. It is hoped that these comments will help to identify the fundamental problems and will also aid in their resolution.

During its review and consideration of the approach, council also identified many generic issues which extend beyond the proposed regulation for silica in construction. Council understands the difficulties involved in developing regulations that are both adequate to protect workers and feasible and practical to implement while being sufficiently flexible to be applied to workers performing different operations under different conditions in different sectors.

Council hopes that the information and analysis will be useful to you in a reconsideration of the approach to the regulation respecting silica in construction and in the development of regulations in the future.

Yours truly,

D. R. McCalla
Chairman

cc: G. Thompson
: T. Millard
: A. Gladstone
: A.E. Robinson

Advisory Memorandum 87-III to the Minister of Labour
August 26, 1987

A Review by the Advisory Council of the Process Used to Develop a Standard for Silica - Construction Projects and Aggregate Production and Related Code

INTRODUCTION

In the past, council has conducted its review of the standard setting process leading to the development of designated substance regulations by focusing on three aspects of the process:

1) the analysis of the background documentation (i.e. whether the ministry assembled, reviewed and analysed the available evidence in a reasonable fashion and whether the conclusions reached were compatible with the evidence);
2) the process (i.e. whether the public was provided with sufficient time, information and opportunity to comment on and participate in the development and content of the regulation); and
3) the application (i.e. whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion).

In the case of construction regulations council's review has varied because of differences in the regulations and in the process used to develop them, for example:

1) the background documentation. The construction regulations are developed several years after the designated substance regulations for the mining and industrial sectors, and the same health effects data and analyses have been used. There tends to be less emphasis on these analyses as the construction regulations are not based on exposure limits;
2) the process. The first draft of the construction regulations have been developed by, or in collaboration with, the Construction Safety Association of Ontario;
3) the application. The construction regulations are procedural; they do not have exposure limits or provisions for control programs, or requirements for establishing and involving joint health and safety committees.

Hence, although council's review of the Regulation respecting Silica - Construction Projects and Aggregate Production focused on the same three aspects of the development process, the emphasis varied. The differences will be described in the various sections of the document.

BACKGROUND

A Notice of Intention to Designate Silica was published in June 1980. In August of the same year a proposed regulation was published in *The Ontario Gazette*. The proposed regulation, like all early designated substance regulations, was designed to apply to all workplaces where the substance was likely to present a hazard to the health of a worker. And, as was the case for the other proposed regulations published at that time, the CSAO responded by seeking an exemption and by stressing the difficulties of applying performance regulations to construction. The Regulation respecting Silica (Ontario Regulation 769/83), filed in December 1983, specifically excluded construction.

In January 1985 the CSAO submitted to the ministry a suggested draft regulation for silica in construction. Prior to publicizing a proposed regulation, ministry officials consulted with several industry associations and visited some quarries and a gravel pit.

As a result of these discussions and visits the Legislative Review Committee (LRC) recommended that the regulation should also apply to aggregate production. Hence, the proposed regulation, published in September 1985, and all subsequent drafts included aggregate production. Following a comment period, a revised regulation was presented at a public meeting held in February 1986. There was a 21-day comment period and a further meeting of the LRC, and the proposed regulation and code were submitted to council in July 1986. A summary of the process of developing the proposed regulation is schematically presented in Figure 1 (see page 65).

Owing to other work and considerations, the review of the proposed regulation did not commence until April 1987. A task force of council met with ministry personnel in May 1987 to clarify several issues that had been identified. The agenda for the meeting with ministry personnel is given in Appendix I, and a summary of the responses and discussion at the meeting constitutes Appendix II.

ANALYSIS OF BACKGROUND DOCUMENTATION

During the development of Ontario Regulation 769/83, there was a detailed evaluation of the health effects data. Council's task force, reviewing the developmental process for Regulation 769/83, discussed the data, the exposure limits, and provisions for control and medical surveillance.[1] The background information accompanying the proposed new Regulation respecting Silica in Construction and Aggregate Production[2] contained very little information on these topics. The task force reviewing the construction regulation asked ministry personnel whether there had been a more recent review or re-evaluation of the health effects data (see Question 13, Appendix I). Ministry personnel responded that the lack of emphasis on the health effects data was partly due to the nature of the regulation – i.e. control-by-procedure, which does not contain an exposure limit. It appeared from the discussion that a study by Dr. Muir, to determine the nature of the dose-response relationship between silica exposure and silicosis, was due to be completed in July 1987. It was also indicated that the ministry was analysing the data on possible carcinogenic effects of silica exposure.

Council understands that the purpose of a control-by-procedure regulation is to protect workers from exposures that could be hazardous to their health and that the procedures/controls are designed to protect from 'the worst case scenario'. However, depending upon the results of the analysis of the Muir study, there may be the need to re-evaluate the adequacy of the procedures to protect workers from the hazardous effects of silica.

Other aspects of the background information that were reviewed by council deal with the application and practicality of the regulation.

An issue raised by the affected parties during the process of developing the regulation involved the use of low silica substitutes for sand-blasting. The product in question, which goes by the trade name 'Black Beauty', was investigated by the ministry. Council's task force asked ministry personnel about the status of the investigation (Question 3, Appendix I). Ministry personnel explained that the sample analysed contained less than one per cent respirable silica, hence, would not require control when used for sand-blasting unless the surface being blasted contained silica. However, as the manufacturer advertised the product as containing less than five per cent silica, the use of 'Black Beauty' could not, automatically, be exempt.

It is unclear from the discussions whether the manufacturer and users of 'Black Beauty' are aware that each sample would have to be analysed for its silica content before it could be determined whether or not the silica regulation would apply.

Council notes that there is the potential for very high exposures to respirable silica during sand-blasting operations. Acute silicosis, which appears to be associated with relatively short exposure to high concentrations of respirable crystalline silica, unlike chronic silicosis, is difficult to diagnose and can be rapidly fatal. During discussions with ministry personnel in August 1983, council members had cited reports of deaths, from acute silicosis, of workers who had been 'wearing self-contained units'. At that time, there was also a discussion of the *use* (and potential for misuse) of protective equipment, the potential for using silica-free substitutes and the ban of silica in sand-blasting in Britain (see Reference 1). Council, at that time, understood that the ministry would review the data and determine whether the issues needed to be reconsidered. However, the background information provided to council in 1986 did not include any information or data on an analysis of the hazards to sand-blasters.

Council suggests that the data on the health effects of acute exposure to silica and the use (and potential for misuse and malfunction) of personal protective equipment be reviewed and that consideration be given to banning the use of silica in sand-blasting operations in Ontario.

As the proposed regulation was developed in consultation with the CSAO, it would appear that the issues of uses, users, practicality and feasibility of implementing controls were investigated for the construction industry. However, it appears as though the background information on aggregate production was assembled and analysed after the initial draft had been received by the ministry. The process whereby this information was gathered and the process of making the decision to include aggregate production will be discussed in the next section. Presumably, the sampling data presented in the background information[2] had been collected during routine inspections and while aggregate production was covered under Ontario Regulation 769/83. The data indicate that not only was a large proportion of the samples over the exposure limit but many exceeded the limit substantially. Although it is unclear what actions had been taken to reduce these exposures, it was of concern to council that these data had not been analysed earlier and that interim solutions had not been proposed.

PROCESS

As described earlier and in other reviews,[3] [4] the process of developing the construction regulations is slightly different from other designated substance regulations in that the initial draft is produced by, or in consultation with, the CSAO. The principle of having labour and management work together in the early stages has been endorsed by council.

It appears that, like the draft regulation for lead in construction, the communication at the time the regulations were developed provided for very limited labour input. However, this issue was raised during the review of the lead in construction regulation,[4] and council believes that it is being addressed within the CSAO and by the joint labour-management committee.

As a means of ensuring that both management and labour have reviewed and endorsed papers, proposed regulations and/or recommendations submitted to the ministry, it is suggested that such documents be co-signed by management and labour representatives.

The task force sought clarification from ministry personnel on the rationale for, and process used to make, the decision to include aggregate production in the proposed regulation (Question 2, Appendix I). From the response (Appendix II), it appears that there was consultation with the Ontario Road Builders' Association (ORBA) and the Aggregate Producers' Association of Ontario (APAO). The ministry also visited several quarries and a gravel pit and discussed the issue with CSAO. However, it appears as though labour was not involved or consulted. Ministry personnel pointed out that there was ample opportunity for labour, and/or the affected unions, to respond during the public process, i.e. after the publication of the proposed draft, at, and following, the public meeting. This issue was considered at length, and several concerns were expressed:

- the regulation was proposed as a construction regulation, and affected labour may not have been aware of the moves by the APAO and the ORBA to seek an exemption from Regulation 769/83;
- the consultations with APAO, ORBA and the visits to several quarries and a gravel pit occurred subsequent to CSAO presenting a draft to the

ministry but prior to the publication of a notice or a proposed regulation (see Figure 1 following). The process used for the distribution of the CSAO draft is unclear. Similarly, it is unclear what stimulated the submissions in January 1985 (see Figure 1);

- the joint labour-management committee of CSAO does not have representation from the affected unions and should not be considered to represent labour on this issue;
- whether the issue should have been brought before the Mining Legislative Review Committee (MLRC). Council notes that the MLRC had input or were consulted during the development of Ontario Regulation 769/83, and further notes that the committee has representatives of management and labour involved in mining.

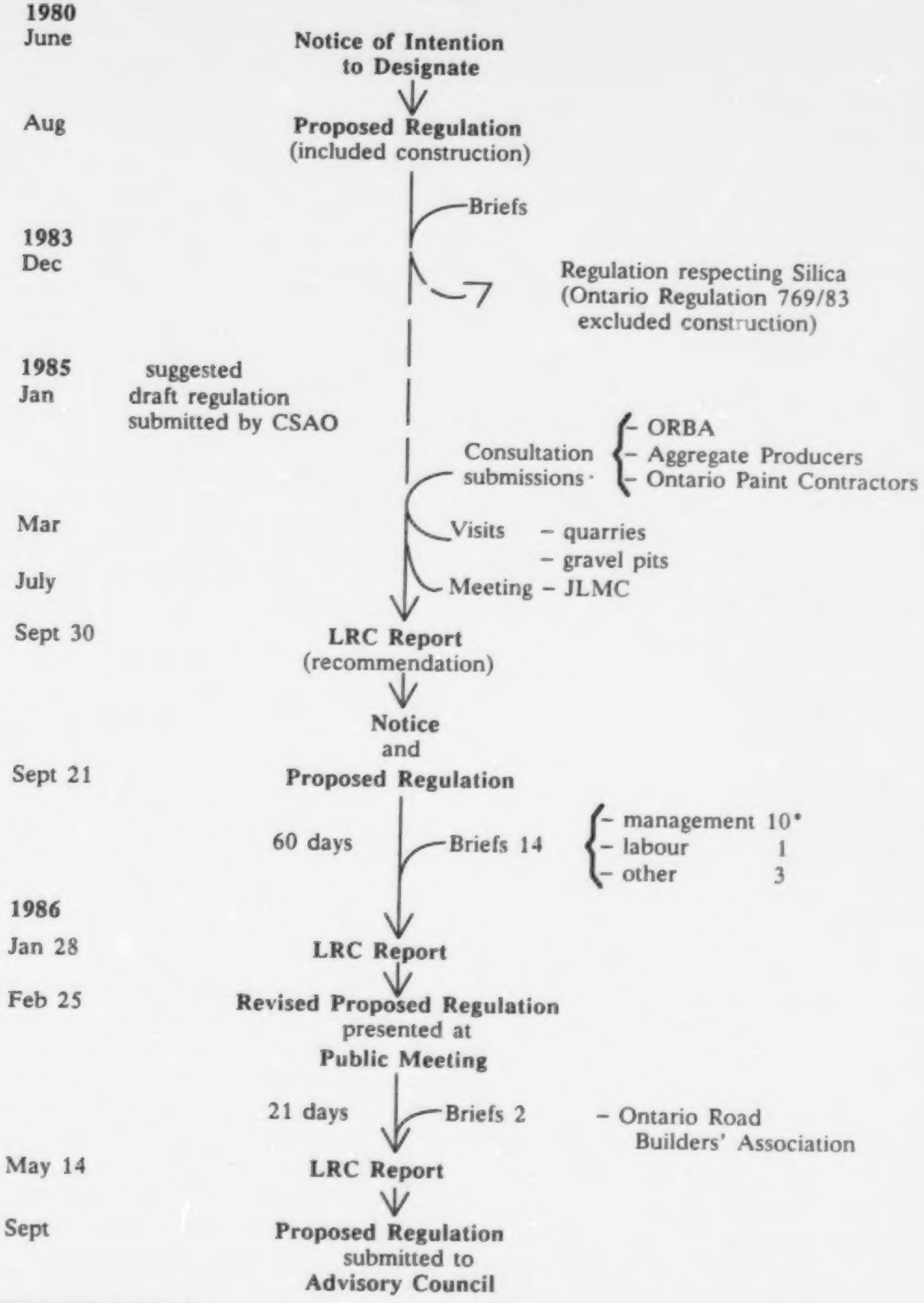
It appears that the APAO sought exemption from the original designated substance regulation during its development in 1980. This was at the same stage in the process as the CSAO sought exemption, and the APAO cited many of the same reasons as the CSAO.[5] It is unclear from the background information provided to council in 1982[6] why aggregate production was not excluded from Ontario Regulation 769/83 at that time.

Council has, in the past, focused its review of the designated substance regulations on the development process in the belief that, if the regulations are developed in consultation with the affected parties, and if the process is open, the important issues of rationale, practicality and appropriateness will be addressed in a manner that will be fair and acceptable to all the affected parties. It is for this reason that council is not commenting on the appropriateness of the decision to include or exclude aggregate production. However, council expresses considerable concern at the process used in making this decision. It is unclear what initiated the consideration of the inclusion of aggregate producers, i.e. whether it was a brief from APAO, the difficulties in compliance perceived by the ministry or a review of outstanding issues from the development of Regulation 769/83. Council notes that when the exemption was considered, the proposed regulation for construction had not been published. Council's concern is that the ministry, having met with representatives of one of the major affected parties, developed a control strategy in consultation with this one group without involving or consulting the other parties that would be affected by the change and/or proposed control strategy.

During its consideration of the means of alerting the parties and of seeking input into the process the task force asked ministry personnel about the process used for informing the 'public' of the public meeting (Question 1, Appendix I). The concern expressed by the task force was that the only parties informed of the meeting were those deemed by the ministry to be interested and those that had already responded or expressed an interest in receiving information from the ministry. The notice of the public meeting specifically invited the recipient, or a representative, to attend the meeting. This led the task force to question whether or not the meeting was really a 'public' meeting. Ministry personnel pointed out that the meeting was open to the public.

Figure 1

PROCESS USED IN THE DEVELOPMENT OF THE PROPOSED REGULATION RESPECTING SILICA IN CONSTRUCTION PROJECTS AND AGGREGATE PRODUCTION


1980
June
Notice of Intention to Designate
Aug
Proposed Regulation (included construction)
Briefs
1983
Dec
Regulation respecting Silica (Ontario Regulation 769/83 excluded construction)
1985
Jan
suggested draft regulation submitted by CSAO
Consultation submissions
- ORBA
- Aggregate Producers
- Ontario Paint Contractors
Mar
Visits - quarries - gravel pits
July
Meeting - JLMC
Sept 30
LRC Report (recommendation)
Notice and Proposed Regulation
Sept 21
60 days
Briefs 14
- management 10*
- labour 1
- other 3
1986
Jan 28
LRC Report
Feb 25
Revised Proposed Regulation presented at Public Meeting
21 days
Briefs 2
- Ontario Road Builders' Association
May 14
LRC Report
Sept
Proposed Regulation submitted to Advisory Council

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* Non-construction companies and associations

Council recognizes the difficulties of notifying affected parties, especially when many of them may not realize the implications of the proposed regulation or that they will be affected. For this reason, council considers that, where there is a deviation from the 'usual' process (in this case the deviation was the inclusion, into a construction regulation, of non-construction operations already covered by an existing regulation), the ministry has the obligation to alert and involve the major parties that would be affected by the change.

APPLICATION

Sections 2 and 4

The proposed regulation is based on a control-by-procedure approach, and only applies to employers and workers carrying out the operations specified in section 4. The operations listed are those that were identified as being likely to involve exposure to respirable silica at levels that could be hazardous to the health of the worker. As there is no exposure limit, there is no obligation on employers to determine exposure levels or to determine whether the silica particles would be respirable. It is assumed that this is the reason why the definition of silica in the proposed regulation for construction ('crystalline silica') differs from that in Ontario Regulation 769/83 ('crystalline silica in a respirable form').

Background studies indicated that certain operations in aggregate production and sand-blasting could generate hazardous levels of respirable silica when the silica content of the materials was above one per cent. It would appear that this is the reason Type 2 and Types 3 (a) and (b) operations apply when materials contain more than one per cent silica. Council notes that there is no such specification for Type 1 operations, and yet, to be included in section 4(1)(e), the silica sand and silica flour must contain (by definition) at least 95 per cent silica. It would appear that if the silica content of the sand in section 4(1)(e) is less than 95 per cent there would be no requirement for control. The task force asked how employers, workers or inspectors know the silica content of the materials (Question 6, Appendix I).

Section 2 of the proposed regulation requires that procedures for the identification of silica shall be those set out in the Code for the Determination of Crystalline Silica in Bulk Samples. However, there is no requirement in the proposed regulation to determine the silica content. Council recognizes the difficulties involved with determining silica levels and of implementing standards that require such determinations; however, the specific concern expressed by the task force was whether the onus was on the employer to determine that the regulation does not apply or on the inspector to determine whether the regulation does apply. In response to this question, ministry personnel explained that it was up to the employers to determine whether or not the materials contain less than one per cent silica and, hence, whether or not the operations would be subject to the controls specified in the regulation.

Council expresses considerable concern that this leaves the decision to the discretion of the employer without requiring an analysis or clearly identifying that it is his responsibility. It is recognized that there is provision for dispute and for dispute resolution in section 4. However, council notes the advantage of avoiding as many disputes as possible and considers that this could be achieved by clarifying the employer's responsibilities to identify operations that will pose a hazard to a worker's health and to protect workers from the hazard.

Council notes that the control-by-procedure approach has many advantages for the construction industry and is much simpler for employers to implement; however, it places the responsibility for identifying the types of operations that are likely to involve exposure to respirable silica on the ministry.

The task force asked the ministry about the protection of workers who may be exposed to respirable silica dust while performing an operation not listed in section 4 (Question 5, Appendix I). During the discussion of this issue ministry personnel indicated that no such operations had been brought to their attention and that it had not been considered necessary to include a 'catch all' clause in the proposed regulation. Council recognizes the difficulty of including such a clause in the proposed silica in construction regulation. It also noted that, unlike asbestos or lead in construction, the different types of operations listed in section 4 are not classified according to the estimated level of potential exposure but by the nature of the operation (or sector) involved, i.e. Type 2 for aggregate production, Type 3 for sand-blasting and Type 1 for all other operations (regardless of the degree of potential hazard).

Council expresses concern about the possibility that there will be potentially hazardous operations not included in the list and that there will be no requirement to protect workers performing these operations. Ministry personnel indicated that if such a situation were to arise, the ministry would consider amending the regulation. Council considers that such a solution would not provide the most effective or efficient means of protecting workers.

The ubiquitous nature of silica and the fact that only certain operations are likely to break the silica into particles small enough to be respirable present major difficulties when attempting to develop a comprehensive list of operations or a 'catch all' phrase to cover hazardous operations.

It is noted that if the proposed regulation, as written, were strictly applied, almost all workers on projects would be required to wear respirators all the time. However, the operations in Type 1 that can generate respirable crystalline silica can vary widely from those representing minor exposures, such as chiselling silica-containing materials, to potentially very high exposures, such as tunnelling through a medium with a high silica content. So, without a means of assessing the exposure to respirable silica, the hazard cannot be assessed and the adequacy of the procedures for control cannot be determined. It is for these reasons that council considers that, in the case of silica, a procedural regulation is not appropriate and an alternative approach should be taken.

As pointed out by ministry personnel (see Appendix II) and in the background information, a procedural regulation should control for the 'worst case scenario'. In the case of silica, it does not appear possible, without an assessment, to devise practical controls to deal with the 'worst case scenario' for all the operations that could be included in Type 1 operations.

In response to a question about whether tunnelling was included (second part, Question 5, Appendix I), ministry personnel explained that tunnelling would be included in section 4(1)(*b*) as a Type 1 operation. During discussion of this issue (Appendix II) the task force noted that there can be tremendous variation in potential for exposure to respirable silica during tunnelling operations and it questioned whether Type 1 controls would be adequate for all situations.*

As it may not always be obvious from the proposed regulation which operations are included, council recommends that a guide should accompany the regulation. If such a procedural regulation is to be promulgated, the information in the guide should include a description of the materials expected to contain silica, the approximate content and when it should be assumed that the regulation would apply. It would also be of value to indicate the types of operations that are likely to generate or disturb particles in the size-range classified as 'respirable', noting that these are likely to pose a hazard to health. Providing such information to employers and employees who are affected, or potentially affected, by the proposed regulation would also help to identify other operations that may pose a hazard but are not listed in the regulation.

It is recognized that much of this information is already included in 'A Guide to the Silica Regulation' prepared by the ministry to accompany Ontario Regulation 769/83. It is not clear whether the ministry is planning to modify this guide or prepare a similar guide for construction.

Sections 6, 7 and 8

Sections 6, 7 and 8 identify the control procedures that apply to operations classified as Types 1, 2 and 3 respectively. The task force considered that it was not always clear who was responsible for complying with the controls (Question 8, Appendix I). Ministry personnel responded that section 3 specifies the parties to whom the regulation applies (Appendix II). Although it was considered the employer's/constructor's responsibility to ensure control, it does not appear to council that it is clearly specified in the proposed regulation. The task force noted that section 7(1) and (2) do not include any 'requiring word' while the 'requiring word' in section 8(1) applies to the work area (i.e. the work area ... shall...). In a brief discussion of this issue (Appendix II), ministry personnel agreed to take the concern 'under advisement' and consult with the Legal Branch.

Council noted that, unlike other control-by-procedure regulations, the proposed regulation contains alternative means of control. For example, the measures and procedures that apply to Types 1 and 2 operations (sections 6 and 7) list engineering controls, and, then, where these are not 'reasonable' (section 7), 'practical' or 'adequate to control the dust' (section 6), the employer is required to provide a respirator.

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* This issue has already been alluded to above and is discussed more fully in the section on control procedures (Sections 6, 7 and 8)

The choice between these alternatives requires discretion. It appears to council that the major advantage of procedural regulations is that they do not rely on discretion. With respect to the issue of engineering controls or personal protective equipment and the determination of reasonableness, adequacy or practicality, council notes that these are decisions to be made at the workplace and provide the flexibility that is the basis of performance regulations. However, performance regulations contain an exposure limit and a requirement for monitoring that can be used as a means of assessing the hazard as well as assessing the adequacy of the controls. Performance regulations also have provisions for mechanisms in the workplace, like joint health and safety committees, whereby the workplace parties can, together, determine what is reasonable, practical, etc. Because of the difficulties involved with implementing such provisions (i.e. exposure limits, monitoring, committees, etc.) in construction, the CSAO sought exemption from the original designated substance regulations and opted for procedural regulations for the construction industry.

Council expresses considerable concern at the nature of the proposed regulation because it is neither strictly control-by-procedure, nor strictly performance-oriented. It appears to council that the combination of features has left many gaps. For example, alternatives for control procedure are specified; however,

- there is no requirement for an assessment;
- there is no standard by which adequacy can be assessed;
- there is no mechanism, involving the workplace parties, to determine what is adequate, reasonable and/or practical;
- there is no requirement to institute engineering controls (no requiring words in section 7(1) or (2));
- there is no requirement, other than the specified procedures, for employers to be responsible for protecting a worker who may be exposed to respirable silica.

This latter feature was of general concern due to the performance-cumprocedural nature of the regulation, and of particular concern in the case of tunnelling. As noted earlier, the potential for exposure to respirable silica can vary tremendously depending upon the medium, the length of the tunnel, duration of the operation, etc. As there were no background data provided to council on the exposures, potential exposures or procedures for control during tunnelling operations, council recommends that the data be reviewed to determine whether the provisions for control specified in Type 1 will be adequate to protect workers against the 'worst case scenario'.

Council notes that the wording of section 7(3)(*b*) of the proposed regulation was changed in response to a comment from an affected party about the need to stress the shared responsibility of the employer and worker in the use of work practices. Council understands that it is difficult for an employer to *ensure* the use of a work practice [section 7(2)(*b*), September 1985 draft]; however, it would also seem difficult for the employer to '*maintain*' work practices [section 7(3)(*b*)].

Sections 9 and 10

In the proposed regulation the sections dealing with training (sections 9 and 10) are general for Types 1, 2 and 3 and yet they are placed between provisions (section 8, and section 11) that are specific to Type 3 operations. This issue was raised in the meeting between the task force and ministry personnel (Question 9, Appendix I), and the task force was informed that sections 9 and 10 could precede sections 6, 7 and 8 (procedures for controlling silica exposure in Types 1, 2 and 3 operations respectively).

As section 10 only applies where there is a health and safety representative (under section 7 of the Act), it appears to be designed only for the construction sector. Council considers that, in the case of aggregate producers that have joint health and safety committees, the committee or a worker member of the committee should be advised of the training.

In considering this issue council noted that aggregate producers that are not construction companies and have less than 20 workers would be required under section 8(2)(*b*) of the Act to establish committees. Council questions the purpose of such committees, i.e. would they deal with general issues of workplace health and safety or exist specifically for the purposes of the designated substance regulations? Council notes that, in the case of designated substance regulations for construction, it is unclear what function(s) such committees would have. The only reference to committees in the proposed regulation is in section 7(2), which requires written notice of the intention to use water sprays be given to 'the joint health and safety committee, trade union, if any, and the director'.

Sections 11 and 12

The task force asked the ministry personnel about the rationale for, and the administration of, section 12 and the silica dust register (Questions 10 and 11, Appendix I). The ministry's response and the discussion at the meeting are summarized in Appendix II.

Noting the transient nature of construction operations, the task force discussed the pros and cons of recording the nature and length of potential exposures for Types 1 and/or 2 operations. This issue was of particular concern where:

1) the workers may have already been on the register because of previous sand-blasting work, and
2) workers may have the potential for high or extended exposures during some operations (e.g. tunnelling operations).

Council recognizes the administrative difficulties that would be involved in recording exposures; however, it expresses concern at the lack of a mechanism to deal with situations where there is potential for high or extended exposures. An example of such a mechanism would be that employers be required to notify the ministry if workers' exposures (while performing Types 1 or 2 operations) exceed 40 hours/month.

According to section 12, the chief physician can require a worker to undergo a medical 'examination' at the employer's expense. Council notes that there is no provision for resolution of disputes in this section. The 'examination' required in section 12 consists of a questionnaire, X-rays and pulmonary function tests to be performed by the Ministry of Labour Chest Clinic. Council considers that the use of the term 'examination', in this context, could lead to confusion and notes that it is unclear how such an 'examination' would be at the employer's expense.

Council has established a task force to consider the requirements for medical examinations in the Act and regulations. Many of the issues surrounding medical examinations raised in the process of reviewing this and previous designated substance regulations will be considered in a broader context by this task force.

Sections 3(2) and 15

During consideration of section 3(2), the task force questioned the equivalency of the protection offered by the Regulation respecting Silica (769/83) and the proposed regulation for construction. From the discussion of this issue (Question 4, Appendix II), it would appear that the provision in section 3(2) allows employers with a control program under 769/83 to retain the control program without the director's written approval while, under section 15, any other employer could apply for exclusion or inclusion in either regulation or institute other controls if they can demonstrate to the director that the variation affords adequate protection.

Council has commented previously on the need for flexibility and the importance of equivalency clauses. In this case, council notes that establishing that the variation affords 'adequate' protection may be less protective than the controls specified in the proposed regulation since the procedures are designed to protect against 'the worst case scenario'.

Another issue raised by the task force at the meeting with ministry personnel was that, according to the wording of section 15 of the proposed regulation, only the employers, not workers or joint health and safety committees, can apply for variance. Ministry personnel agreed to look into this issue.

Council recommends that consideration be given to providing workers/worker representatives/joint health and safety committees the opportunity to apply for a variance under section 15. Council also recommends that, prior to an employer (or worker, as the case may be) applying to a director for a variance, he or she be required to notify the workers (or employer) of the variance sought. Ideally, applications would be submitted to the director after the parties had discussed the issue and agreed upon the nature of the variance. Similarly, council recommends that there be a requirement to notify all the affected parties when a variance has been approved by a director.

Code for the Determination of Crystalline Silica in Bulk Samples

The task force asked ministry personnel the rationale for excluding tridymite from the Code (Question 7, Appendix I). The issue was of concern to the task force because tridymite and crystobalite are considered to be more fibrogenic than quartz. Ministry personnel explained that the proposed regulation applied to all crystalline silica (including quartz, crystobalite and tridymite) and that although the Code did not specify the technique used for determining tridymite, it noted that a similar procedure should be used. The reasons cited for not specifically including tridymite were:

- tridymite is rarely found in construction material, and
- pure samples of tridymite (needed for standardizing the analysis) are difficult to obtain.

Council recommends that, included in the guide, there should be:

- information on the different degrees of hazard presented by the different polymorphs,
- a description of materials likely to contain tridymite and crystobalite, and
- an explanation of the need for analysis and what should be done if tridymite is suspected.

Proposed Amendment to Ontario Regulation 769/83

Council wonders what is meant by the distinction between 'a worker' and 'a person' and whether this is clear in the amendment.

Form I

Council notes that the 'Types of Operations Causing Silica Exposure' listed as A, B and C on Form I are listed in the proposed regulation as b), c) and a) respectively. Although this is a very minor point, it could create unnecessary confusion.

Other Issues

It appears to council that, apart from the principal (and, possibly, insurmountable) difficulty of developing a procedural regulation for silica, a number of difficulties with the proposed regulation arise from the inclusion, in a construction regulation, of employers and workers that are not considered to be in construction. The proposed regulation for silica was specifically designed for construction. Aggregate producers who are presently covered by Regulation 769/83 are also covered by the mining regulation (660/79) and Regulation 654/86, and these regulations have general duty requirements that are different from those in the construction regulation (691/80). Other differences include the specification of exposure limits for various agents including nuisance dusts, and the requirement for joint health and safety committees.

Up until 1983 the workers in aggregate production would have been required to have a medical certificate (under the mining regulation (660/79)). Post 1983, the aggregate production workers should have been included in medical surveillance programs under Regulation 769/83. However, once regulation 769/83 is amended and the proposed regulation is promulgated, there will be no provisions for medical examinations or for recording silica exposures (or even potential for exposure). It is unclear what will happen to the exposure and medical records of these workers.

During council's review of the proposed designated substance regulation for silica in construction, a number of generic issues were identified, including:

- the exemption of construction from designated substance regulations and other regulations (e.g. 654/83) for the mining and industrial sectors;
- the ability of sectors, industry groups or types to opt for one or other of the regulations;
- the equivalence of the protection offered to workers in different sectors;
- the advantages and disadvantages, including the essential features and practicality, of performance versus procedural regulations;
- whether there should be some provision for joint health and safety committees in construction; and,
- the need for a mechanism to identify areas/sectors that are having difficulty implementing or complying with regulations.

Such a mechanism would then need to analyse and initiate problem-solving strategies.

These generic issues extend beyond council's review of the process for the development of the proposed silica in construction regulation. However, council considers these to be extremely important issues and plans to discuss them in a more generic context.

References

1. Advisory Memorandum 83-I: A Review by the Advisory Council of the Process Used to Develop a Standard for Silica and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Exposure to Silica in the Workplace, published in *Advisory Council on Occupational Health and Occupational Safety, Sixth Annual Report, April 1, 1983 to March 31, 1984.*

2. The Report to the Advisory Council on Occupational Health and Occupational Safety on the Proposed Regulation Respecting Silica – Construction Projects and Aggregate Production, submitted by, the Occupational Health and Safety Division, June 1986.
3. Advisory Memorandum 85-III: A Review by the Advisory Council of the Process Used to Develop a Standard for Asbestos on Construction Projects and in Buildings and Repair Operations and Related Codes, published in *Vol. I, Advisory Council on Occupational Health and Occupational Safety, Eighth Annual Report, April 1, 1985 to March 31, 1986.*
4. Advisory Memorandum 86-IV: A Review by the Advisory Council of the Process Used to Develop a Standard Respecting Lead on Construction Projects and Related Codes, published in *Advisory Council on Occupational Health and Occupational Safety, Ninth Annual Report, April 1, 1986 to March 31, 1987.*
5. A Brief to the Minister of Labour from Aggregate Producers' Association of Ontario re 'Notice of Proposed Regulations' dealing with designated Substances under the *Occupational Health and Safety Act, 1978* – dated August 16, 1980.
6. The Report on the Designation of Silica in Ontario by the Occupational Health and Safety Division, December 1982.

APPENDIX I

Agenda For Discussion With Ministry Personnel re Silica – Construction Projects and Aggregate Production

1) What is the process used to inform the public of the public meeting?

2) What was the rationale for, and process used to make, the decision to include aggregate producers in the draft regulation submitted by CSAO, i.e. between January and July 1985?

3) What is the status of the study on silica exposure during the use of 'Black Beauty'?

4) If an industrial employer instituted a control program under Regulation 769/83 after the date the regulation for silica in construction is filed, could that employer apply to the director (under section 15 of the Regulation respecting Silica – Construction Projects and Aggregate Production) to include workers working on a project in the control program under Regulation 769/83?

5) Are there any requirements/procedures/controls to protect workers who may be exposed to airborne respirable silica while performing an operation not listed in section 4 of the regulation?

   Is tunnelling included?

6) How do employers, workers or inspectors know the silica content of materials?

7) What is the rationale for excluding tridymite from the Code? Does the regulation apply equally to tridymite, cristobalite and quartz? Is calcined diatomaceous earth used in any building material? If so, is its use likely to pose a hazard? Would this be covered under the proposed regulation?

8) It is not clear from the regulation who is responsible for ensuring compliance with some sections, e.g. section 7(1) and (2) and section 8(1).

9) What is the rationale for having sections 9 and 10 (general requirements for Types 1, 2 and 3) follow requirements specific for Type 3 and in between the requirements and responsibilities for the silica dust Workers' Register?

10) Will the silica dust register include workers performing Type 1 and 2 operations?

    If not – is there any mechanism for recording Types 1 or 2 exposure for workers already on the register?

11) Could the ministry personnel please explain section 12 and how it would be administered?

    Is there any mechanism for dispute?

    Does section 12 mean that there is no provision for a worker to get a medical *examination* at the employer's expense?

12) Is there any provision for pre-employment or pre-placement examinations to detect predisposing lung disease?

13) Did the development of the Regulation respecting Silica – Construction Projects involve a review or re-evaluation of the health effects data?

APPENDIX II

Summary of the responses to 'Issues for Discussion' at the meeting between ministry personnel and the task force reviewing the process of developing the Regulation respecting Silica - Construction Projects and Aggregate Production

Question 1

Ministry personnel explained that the process used to inform the public of the public meeting was basically the same as that used for other designated substances, i.e. a notice is mailed to interested parties about 30 days in advance of the public meeting. In the case of silica in construction, the notification period was only three weeks due to difficulty booking a room for the meeting. It was clarified that interested parties included companies, organized labour and trade associations that were on the ministry's mailing list for construction, as well as any other parties that responded to the notice of intent, commented on the proposed regulation(s) or expressed an interest in being included on the mailing list. In the case of silica in construction, the notice had been mailed to about 200 'interested parties'.

In response to a question, it was clarified that the notice of the meeting is not gazetted or published in the press. With respect to how the mailing list is compiled, it was explained that the ministry has a number of lists of parties that would be interested, affected, have responded or expressed an interest, i.e. there is a general list for construction, supplemented, as appropriate, for each individual regulation.

In response to a question about the use of the word 'public' when it was a selected group that was informed of the meeting, it was explained that the meetings are open to the public and that the purpose of such meetings is to explain the changes that have been made to the proposed regulations that have been gazetted.

With respect to professional associations that are on the mailing list, it was pointed out that associations such as hygiene associations and nurses' and physicians' groups are on the general mailing list but, depending on whether they had responded or expressed a specific interest, they may or may not have been on the specific list for silica in construction.

Question 2

Ministry personnel explained that in February 1985 the Ontario Road Builders' Association and the Aggregate Producers Association of Ontario (APAO) approached the ministry with a request for an exemption from the silica regulation (769/83). As some of the aggregate producers were construction companies and would be covered under the proposed regulation for silica in construction, the APAO noted the merit of applying the procedural approach to all aggregate producers.

Following the meeting with the APAO, the ministry discussed the proposal with the Mining Health and Safety Branch and the CSAO; personnel toured several quarries and a gravel pit and it was concluded that there were good reasons for including aggregate producers in a procedural regulation, i.e.:

1) aggregate production has a high percentage of small companies. Many are owner-operated;
2) many producers work out of wayside pits with portable equipment, rather than fixed equipment, for short times and then, depending on the site(s) they are supplying, move to different locations;
3) the work force tends to be highly mobile;
4) the operations are performed outdoors;
5) many of the larger producers are construction companies that produce aggregate for their own construction projects;
6) the nature of the operations and changing location and conditions make the development of control programs impractical (e.g. difficulties involved with air monitoring to determine representative exposures of workers);
7) the lack of education, training and information on the hazards, both for employers and workers, and the lack of virtually any health and safety personnel; and
8) experience of the Mining Health and Safety Branch with aggregate producers indicated that there were serious difficulties implementing the existing Regulation respecting Silica (Ontario Regulation 769/83). Personnel involved in administering the regulation considered that a procedural regulation would be more appropriate.

In response to a question, it was explained that the reason for developing procedural regulations was to provide protection that is at least equivalent to, if not better than, the performance regulations. The procedural regulations were considered to be easier to implement, easier to understand and easier to enforce. It was added that the procedural regulations did not include monitoring and were designed to protect against the 'worst case scenario'. The difficulties of monitoring under such conditions were stressed.

There was a brief discussion about the results of air monitoring at quarries and pits, which had been provided to council in the background information.

The task force noted that section 7 of the proposed regulation did not follow the 'usual' format for procedural regulations. The first two subsections addressed options for engineering controls; the second was qualified by the requirement that it afford protection equal to or greater than the protection given by the controls prescribed in subsection 1. However, the third subsection dealt with the personal protective equipment and work practices for circumstances where the engineering controls are not reasonable or practical to control the exposure of a worker to airborne silica. It was noted that the use of these various subsections would appear to depend on decisions about the level of protection afforded by the various procedures, and this would appear to imply that there is monitoring or a knowledge of levels. The ministry personnel were asked whether the onus for this determination would now be on the ministry rather than on the employer.

Ministry personnel responded that the enginering controls in subsection 1 are straightforward and, if implemented correctly, would be adequate and relatively constant; hence the levels could be monitored. It was pointed out that air conditioned cabs with HEPA filters are the ideal engineering control since heat, noise, silica, dust, etc. are all controlled at the same time. With respect to water sprays (subsection 2), it was noted that they are only practical in some situations. Only about 10 per cent of the present operations could use water sprays on a full-time basis. The companies presently using this means of control had approached the ministry to enquire whether it was acceptable. Monitoring had been done in some circumstances and it had been shown that wetting had adequately controlled the respirable silica. It was noted that the monitoring at the source had been performed as opposed to personal sampling.

There was further discussion about whether the provisions for aggregate production were really procedural. Ministry personnel pointed out that the operations in aggregate production are capital intensive and there are very few options for controlling the exposure during the operations. They stressed that the onus for determining the adequacy of the controls is on the employer.

In response to a question from the task force, it was explained that the major aggregate producers are unionized and that there had been consultation. There was a brief discussion about the degree of unionization and about the nature of the consultation whether it was at the work site, whether it involved joint health and safety committees and local or national offices and which unions were involved. It appeared as though the national/international offices of the major unions had not been consulted.

The task force pointed out that the joint labour-management committee of CSAO does not include the unions involved in aggregate production; therefore, it could not be considered to be speaking for labour on the provisions for aggregate production.

Ministry personnel observed that the degree of unionization appeared low in the small companies, and silica exposure in aggregate production did not appear to be a concern. There was further discussion about the consultation with labour and whether the appropriate unions had been contacted. It was pointed out that, as with the development of other regulations, if the unions had not responded or expressed interest in the issue they would not have been contacted. However, during the visits to pits and quarries, personnel from the Mining Health and Safety Branch discussed the proposed regulation with the parties.

The task force noted that the Mining Legislative Review Committee (MLRC) had been involved (consulted) during the development of Ontario

Regulation 769/83. In response to a question about whether the committee had had any input or had been consulted on the decision to include aggregate production in the construction regulation, the ministry personnel noted that the MLRC had not been involved.

Clarification was sought about the procedures that should be used if aggregate contained fibres as well as silica. Ministry personnel pointed out that if asbestos were present, the asbestos regulation would also apply and the regulation with the most stringent controls would take precedence.

In response to a question, ministry personnel explained that the Mining Health and Safety Branch enforces construction regulations on any construction site that it inspects, e.g. on mining property – so it would enforce the proposed regulation at sites of aggregate production.

Question 3

Ministry personnel explained that both personal and bulk sampling of 'Black Beauty' was conducted by the CSAO. The silica content of the bulk sample analysed was below one per cent so its use would not be classified as a Type 3 operation. However, the nuisance dust level was well above the limit (the average sample was about 10 times the limit). It was pointed out that section 34 of the construction regulation (691/80) requires the use of respiratory equipment for high dust exposure situations.

Since the manufacturers of 'Black Beauty' guarantee less than five per cent crystalline silica content, 'Black Beauty' cannot be exempt from the regulation. Each situation would have to be evaluated separately.

In response to a question from the task force, it was explained that the Ministry of Labour would only analyse bulk samples if the request for analysis were initiated by an inspector and if the sample were collected by ministry personnel.

Question 4

Ministry personnel responded that an employer could, under section 15, apply to a director if he wished to use controls other than those specified in the regulation. Each request for equivalency would be evaluated individually. There was a brief discussion about whether the equivalency provision (section 15) altered the interpretation of the 'grandfather clause' [section 3(2)]. It appeared as though a request under section 15 would require an assessment of the variance, whereas under section 3(2) an employer could control exposure via a control program (established under Ontario Regulation 769/83) if one were in place, i.e. without needing to apply to the director and without the requirement that the program be evaluated.

The task force asked whether workers, joint health and safety committee members or unions could, under section 15, request to be covered under a control program established under Ontario Regulation 769/83. It was pointed out that, as written, it is the employer who applies to the director for variance. There was a discussion of this issue, and the ministry personnel suggested that it would be taken 'under advisement'.

Question 5

In response to this question, it was explained that in the Regulation respecting Asbestos in Construction, there is a 'catch all' provision stating that any operation that is not specifically classified should be considered as Type 2 and, hence, the controls for Type 2 should be applied. However, a similar 'catch all' clause was not included in the proposed silica regulation because the ministry had considered that operations not classified would probably involve insignificant exposures to respirable silica. The issue of other operations, and/or a 'catch all' clause, had not been brought forward to the ministry by any of the parties.

It was noted that the issue of whether tunnelling was included had been raised after the public meeting by Construction Health and Safety Branch personnel. Ministry personnel considered that tunnelling was covered by the regulation and that it would be classified under section 4 (1)(b) - drilling holes in concrete or rock on or at a project, e.g. Type 1. It was further noted that nearly all tunnelling operations use wetting as a means of dust control. The ministry had sought input from management and labour through the CSAO and they had concurred with the interpretation. There was a brief discussion about the controls required for Type 1 operations and what (and who) determines whether engineering controls are adequate. The task force pointed out that tunnelling can present a severe risk of silicosis (an example was cited). It was noted that conditions, the silica content of the medium and the ability to control the risk vary from one tunnel to another and from one area of a tunnel to another.

The task force noted that it would be difficult to develop a 'catch all' clause in the proposed regulation to accommodate an operation as variable as tunnelling. It was also pointed out that Types 2 and 3 were very specific types of operations and everything else was included in Type 1, regardless of the extent of the potential exposure.

In response to a question about the practicality of notifying the ministry or requiring a permit for tunnelling operations over a certain size or duration, ministry personnel noted that there are only three inspectors in Ontario dealing with licensing or permits. Hence, such a provision would be difficult to administer.

There was a discussion about whether the ministry could, following an assessment of the potential for hazard, recommend more stringent controls. It was pointed out that any provisions for different controls, due to differences in size, length or potential for exposure, would require an amendment to the proposed regulation. It was noted that the hazard depended not only on the size and duration of the operation but also on the medium through which the tunnel was being constructed.

It was explained that the ministry had consulted with the CSAO on this issue and the CSAO had consulted labour and management and concluded that tunnelling should be included as Type 1. However, the issue of the variations in tunnelling had not been the focus of the discussions.

The task force's concerns were noted, and it was suggested that the ministry could take it back to the CSAO for discussion with the joint labour-management committee.

There was further discussion about Type 1 being the only type for procedures other than sand-blasting or aggregate production and the need for a 'catch all' clause. Ministry personnel suggested the regulation could be amended if any other operation (not already classified) with the potential for exposure to respirable silica were identified. This led to a discussion of the legal difficulties that would be involved if directors were provided with discretionary powers and how this would compare with (or overlap) section 14(2)(*g*) of the Act (the general duty clause).

The task force noted that the background information provided to council indicated that the exposures for operations classified as Type 1 would be less than 10 times the TWAEL (i.e. 2 mg/m^3) and those classified as Type 3 would be greater than 10 times the TWAEL. However, the proposed regulation did not reflect this distinction. It was asked whether the proposed regulation could include such a distinction so that operations like tunnelling could be classified as Type 1 or Type 3, depending on the potential exposure. Ministry personnel responded that the purpose of the procedural regulation was to avoid introducing exposure measurements. This led to a discussion about the implications of 'where adequate', the difficulty of 'catch all' clauses and the definition of silica.

Ministry personnel noted that there had been about 150 requests for variances under the asbestos in construction regulation and only one had been identified as not fitting one of the categories listed.

The task force expressed concern at the prospect of an inspector identifying a problem, sampling the air and determining a high level of respirable silica yet, if the specified procedures were in place, being not able to act. It was confirmed that sampling is not used in the enforcement of procedural regulations.

In response to a question about the use of the term 'sand-blasting', it was explained that even shot blasting would be included as Type 3 if the substrate being blasted contained silica.

Question 6

It was considered that this question had been answered in the preceding discussion.

The task force noted that section 2 referred to the Code but does not include a requirement to determine the silica content of the materials used. It was clarified that the section provides a means of maintaining technical control over measurements of silica content if they are performed.

It was pointed out that a number of quarries and pits are anxious to be exempt from the regulation, so they would need to determine that the silica content of the materials is less than one percent.

The task force noted that, as there is no requirement for assessment, it could be assumed that the materials are less than one per cent. It was noted that the ministry already have data that indicate where the proposed regulation would apply and that the ministry will be checking.

With respect to quality control for the analysis of samples, it was clarified that any laboratory that follows the Code could perform the analysis, and if there were any question, the ministry would evaluate it.

Question 7

Ministry personnel responded that the proposed regulation applies to tridymite, cristobalite and quartz since they are all forms of crystalline silica. It was pointed out that there was no intention to specifically exclude tridymite from the proposed regulation, but it was not included in the Code because it was not considered to be common in construction material and because its determination requires a standard sample for calibration. Such standards are difficult to obtain. It was pointed out that the Code notes that the same procedure could be used for tridymite.

It was confirmed that crystobalite, then tridymite, is produced after quartz is heated to a high temperature. It is also present in volcanic rock. The task force pointed out that cristobalite and, especially, tridymite are more fibrogenic than quartz and that the limit of 0.2 mg/m^3 in Ontario is about four times the TLV for tridymite and cristobalite.

With respect to the third and fourth parts of the question, ministry personnel explained that calcined diatomaceous earth is used. It could be a component (up to 60 per cent crystalline silica) of the refractory bricks in building materials and would be included in Type 1 of the proposed regulation. It was noted that when any material containing silica is calcined, the percentage of crystalline silica will increase.

Question 8

In response to this question, it was explained that section 3 covers the application of the regulation and that the wording of sections 6, 7 and 8 had been discussed with Legal Branch and no problems had been identified. The ministry considered that it was clear that it was the constructor's or employer's responsibility for ensuring control, and it was pointed out that the wording was based on that used in the asbestos regulation.

The task force noted that the wording of section 7(3)(*b*) had been modified to accommodate a concern expressed by one of the parties that it was not clear that the responsibility was on both the worker and the employer/constructor. The question of whether it is the employer or the worker who maintains the work practices was raised. It was suggested that there are two sets of responsibilities: the employer's responsibility to establish programs, facilities and practices and the worker's responsibility to work in compliance with these.

The concern was noted, and it was suggested that the point be discussed with the Legal Branch.

Question 9

It was reported that Legal Branch had agreed that sections 9 and 10 (requirements general to Types 1, 2 and 3) could be brought forward in the regulation to precede the specific requirements for each of the types.

Question 10

Ministry personnel explained that the requirement to notify the ministry was restricted to workers performing Type 3 operations, hence only those workers would be included in the silica dust register. This decision was made because it was considered that workers performing Type 3 operations were at greater risk and should have periodic surveillance.

It was noted that there could be instances where notification for Types 1 and 2 operations could be of value, but that, although it would not pose a problem for the ministry, it would be onerous for the employers.

There was brief discussion about the case of sand-blasters with significant exposures already on the register who could then perform Type 1 or 2 operations but who would not have these exposures added to their records.

The task force noted that, due to the transient nature of construction work, without the requirement for notification there would be no record of a worker's exposure or potential exposures. The suggestion was made that this issue be taken to the joint labour-management committee of CSAO for consideration.

It was further noted that it would be important to have records when compensation is sought.

There was a brief discussion about the 'amount of paper' required to generate the records especially considering the low incidence of silicosis. It was noted that in some jurisdictions silica is considered to be a potential carcinogen.

Question 11

It was explained that once the ministry is notified, the records are put on a data base (the silica dust register). When a worker has had the equivalent of one year's exposure (2,000 hours) the ministry would write to the individual and invite him to attend one of the ministry's chest clinics (fixed site or mobile). At the clinic he would be given X-ray and pulmonary function test(s) and a questionnaire. The results and explanations would be sent to a physician of the worker's choice. Presumably, the worker's physician would follow up with an examination, etc., where needed, and would advise the worker accordingly. If there were any evidence of silicosis, the doctor would be advised to notify the Workers' Compensation Board and to register a claim. The ministry also has a trigger mechanism to follow up in cases where the claim is not registered.

With respect to the cost, it was explained that the clinical tests are covered by the Ministry of Labour and that, presumably, in many cases, the physician's follow-up examination would be covered by OHIP. Although the regulation includes the provision for the examination to be at the employer's expense, many of the workers may not be employed at the time.

There was a brief discussion about the phrase 'as required by the Chief Physician' and about whether the worker has any choice, whether there is a mechanism for dispute and what recourse the ministry would be likely to take if a worker refused.

In response to questions, it was explained that the ministry is planning to continue its practice of analysing the data and plans to publish, in the annual report, the numbers screened and numbers detected, and to break down the figures by industry. It was also explained that the X-rays are interpreted according to both the ILO and Workers' Compensation Board classifications.

Ministry personnel explained that the discrepancy between the number of Workers' Compensation Board claims and the numbers identified by the MOL Chest Clinic was due in part to the use of the Workers' Compensation Board classification. Category 4 does not necessarily indicate pneumoconiosis, but only that there is accumulation of dust in the lungs, and yet this has led to some claims. And, although Category 5 indicates early silicosis, many workers do not initiate claims because they do not want the stigma associated with the diagnosis of silicosis.

Regarding the responsibility of the MOL to inform a worker if early signs of silicosis are detected, it was explained that the ministry is functioning as a laboratory service and the examining physician receives the results. In the event that a pneumoconiosis is not reported, the Chest Clinic alerts the regional medical officer, who will go to the site and contact the examining physician to determine whether it was an oversight or a deliberate decision not to initiate a claim. This led to a brief discussion about the legal implications if the ministry knows and does not inform the worker.

Question 12

Ministry personnel responded that, in the proposed regulation, there is no provision for pre-employment or preplacement examinations. Since silicosis is a chronic disease and since the incidence of TB is very low, there appeared to be no justification for such preplacement screening. Task force members noted that silica TB is a severe complication of silicosis, and concern had been expressed at the potential for workers to be exposed to TB and silica. This was considered an issue because of the increased incidence of TB in the immigrant population, who are often employed on construction projects.

Question 13

Ministry personnel responded that, as the proposed regulation is control-by-procedure and does not contain exposure limits, a re-evaluation of the health effects data was not initiated specifically for this regulation. However, the information on the health effects associated with silica exposure is collected and the data indicating the carcinogenic potential are being analysed. It was pointed out that, to this time, there does not appear to be a dose-response relationship between silica exposure and carcinogenicity, and if there is any association it is probably with silicosis.

In response to a question about the status of the Muir Study that was looking for a dose-response relationship between silicosis and silica exposure, it was explained that the report was due to be submitted to the ministry by June or July 1987.

In response to a question about whether it would be acceptable to the ministry if the worker and employer agreed that the X-ray, pulmonary function tests and questionnaire be conducted at the plant site, ministry personnel noted that it would be acceptable if the tests were equivalent.

Advisory Memorandum 87-IV

Ontario

Advisory Council on Occupational Health & Occupational Safety

Conseil consultatif de la santé et de la sécurité au travail

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September 28, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
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Dear Mr. Wrye:

On behalf of council I am forwarding Advisory Memorandum 87-IV. This memorandum contains council's comments on the process used in the development of the proposed formaldehyde regulation.

I hope that these comments will be helpful and of use for the future work of your ministry.

Yours truly,

DR McCalla

D. R. McCalla
Chairman

cc: G. Thompson
T. Millard
A. Gladstone
A. E. Robinson

Advisory Memorandum 87-IV to the Minister of Labour September 28, 1987

A Review by the Advisory Council of the Process Used to Develop a Standard for Formaldehyde and Related Codes and Council's Evaluation of the Criteria Used to Assess the Hazard of Formaldehyde in the Workplace.

In the past, council has conducted its review of the standard setting process leading to the development of designated substance regulations by focusing on three aspects of the process:

1) the analysis of the background documentation (i.e. whether the ministry assembled, reviewed and analysed the available evidence in a reasonable fashion and whether the conclusions reached were compatible with the evidence);
2) the process (i.e. whether the public was provided with sufficient time, information and opportunity to comment on and participate in the development and content of the regulation); and
3) the application (i.e. whether the regulation and codes are internally consistent and whether the intent of the ministry is expressed in a clear and unambiguous fashion).

BACKGROUND

Formaldehyde was one of four substances listed on a Notice of Intention to Designate published in the *Ontario Gazette* in November 1982. Thirty briefs were submitted during a 60-day comment period. In July 1983 a proposed regulation for formaldehyde and related codes were published with a Notice calling for comments to be submitted within 30 days. Following a recommendation by the Legislative Review Committee, a revised regulation was presented at a public meeting in October 1983; comments were submitted and meetings and plant visits were conducted. Due to differing opinions on how the health effects literature should be evaluated, the issue of whether or not formaldehyde should be designated remained controversial. In 1984 the ministry commissioned an expert panel to examine the health effects literature. The expert committee's report was submitted in January 1985. Subsequently, the ministry circulated the report to those parties that had expressed an interest in the designation of formaldehyde, along with a letter asking whether the report had altered their opinion about the proposed designation. Twenty-two responses were received.

In June 1986 a revised regulation and background information were submitted to council. At the same time, the revised regulation was circulated to interested parties with a letter explaining the major changes.

Council established a task force in August 1986, and in September, following a review of the process used to develop the proposed regulation, the task force met with ministry personnel to seek clarification on a number of issues. The agenda for discussion at the meeting is presented as Appendix I, and a summary of the responses and discussion constitutes Appendix II. The process of development is schematically depicted in Figure 1 below.

INTRODUCTION

Formaldehyde has become one of the most controversial substances for regulators all over the world. This controversy stems from the uncertainty about its carcinogenic effect on humans and, because of its ubiquitous nature and widespread use, controlling formaldehyde as a human carcinogen would have an enormous impact on many industries. Due to the divergent views on the science, on issues and on weighting of the various factors that need to be considered when deciding whether or not to regulate, the process of deciding and developing regulatory controls is very difficult and needs very careful consideration.

Council's review of the process of developing designated substance regulations focuses on whether or not there was ample opportunity for public input and participation, and whether or not the basis for the levels and the reasons the substance was regulated are clearly stated.

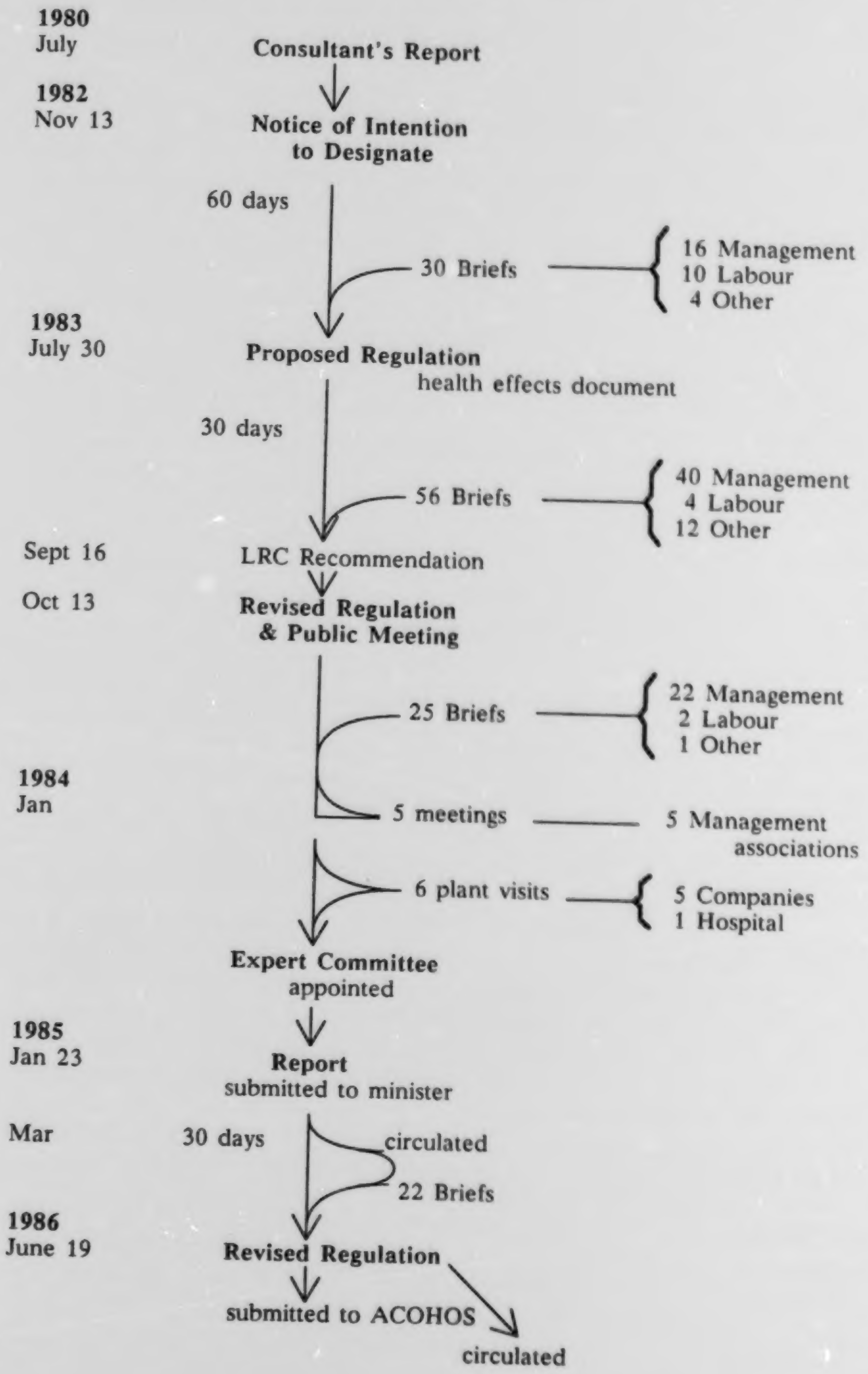
In the case of formaldehyde, council commenced its review with an analysis of the information gathered by the ministry; then it considered the ministry's analysis and interpretation of the analysis that led to the decision to designate. Council next attempted to follow the process used to develop the proposed regulation, taking note of new information and scientific data that accumulated during the developmental period. Hence, in this review, the analysis of background information and the consultative process are closely interrelated and are dealt with together in chronological order.

ANALYSIS OF BACKGROUND DOCUMENTATION AND CONSULTATIVE PROCESS

The ministry's consideration of the need to designate formaldehyde arose, in part, due to studies by the Chemical Industry Institute of Toxicology (CIIT) that indicated that formaldehyde caused nasal tumours in rats. These findings were considered to be of particular importance because of the wide-spread use of formaldehyde in Ontario. At the same time, there was considerable media coverage of the alleged adverse health effects caused by formaldehyde that was being released from urea formaldehyde foam, which had been extensively used to insulate buildings.

Figure 1

PROCESS USED IN THE DEVELOPMENT OF THE PROPOSED REGULATION RESPECTING FORMALDEHYDE


1980
July
Consultant's Report
1982
Nov 13
Notice of Intention to Designate
60 days
30 Briefs
16 Management
10 Labour
4 Other
1983
July 30
Proposed Regulation
health effects document
30 days
56 Briefs
40 Management
4 Labour
12 Other
Sept 16
LRC Recommendation
Oct 13
Revised Regulation & Public Meeting
25 Briefs
22 Management
2 Labour
1 Other
1984
Jan
5 meetings
5 Management associations
6 plant visits
5 Companies
1 Hospital
Expert Committee appointed
1985
Jan 23
Report submitted to minister
Mar
30 days
circulated
22 Briefs
1986
June 19
Revised Regulation
submitted to ACOHOS
circulated

As with other substances considered for designation, a study was commissioned on implications of formaldehyde on the health of workers in Ontario. This study[1] included analyses of the health effects, commercial use, exposure control and monitoring, public reaction and formaldehyde standards. It served as background information for the decision to designate in 1982.

The decision to designate has, in the past, been based on a recommendation from the Legislative Review Committee (LRC), and a summary report of the LRC has been included in the background information provided to council. In the case of formaldehyde, there is no record of the decision. The background material provided to council notes that the decision was based on 'the widespread use, the finding in the consultant's study that excessive exposures occur in certain industrial sectors, and the potentially serious health effects of formaldehyde'.[2] It would appear that the decision to regulate was, at least in part, a response to pressure and to media coverage of potential carcinogenicity of formaldehyde.

Council's task force asked ministry personnel the rationale for the decision to designate (see Question 1, Appendix I). The response to this question led to a lengthy discussion of the health effects, the health effects data and various interpretations of the data (see Appendix II).

It is not the purpose of this document to recount the extensive discussion nor to offer council's interpretation of the health effects data; but, as mentioned earlier, the rationale for designating formaldehyde and the process of determining the limit are dependent upon the results of the analysis of the data. For this reason, council attempted to review the logic for the various decisions in the process and to determine whether it was clear to the affected parties so that they could participate in, or, at least, provide input into, the process, and be more likely to understand the rationale for, and accept, the result.

With respect to the original decision to proceed to designate and the nature and content of the original, proposed regulation, it is unclear how much weight was put on the health effects document prepared by ministry staff.[3] The date on the document indicates that it was completed at the same time as the first proposed regulation was published, i.e. eight months after the Notice of Intention to Designate (see Figure 1). The title of the document[3] implies that its purpose was to recommend exposure limits to be used in the proposed regulation.

In response to a question from the task force, ministry personnel indicated that the contents of the document had been reviewed and discussed prior to the publication of the draft regulation. In the discussion that followed this question (see Question 2, Appendix II), it was noted that the document had not been peer reviewed. Ministry personnel pointed out that, since then, council has given advice on the issue[4] and the task force was informed that, in future, the ministry plans to publish the health effects documents before the proposed regulation and, if possible, before the Notice of Intention to Designate.

Council expresses considerable concern about the health effects document, as did many of the respondents. Many of the criticisms of the review of the literature may be influenced by more recent data and the wisdom of hindsight. The data on formaldehyde are inadequate, confusing and controversial. In this context, it is of interest to note a summary statement in the consultant's report published several years earlier.[1] 'The greatest obstacle to the development of a strategy for the protection of workers' health from the effects of exposure to formaldehyde are deficiencies in knowledge of the chronic, carcinogenic and sensitizing effects of formaldehyde. Even data on the threshold for acute primary irritation in humans are controversial.'

However, council's primary concerns with the ministry's health effects document are the conclusions and the process used to reach the conclusions. Owing to the degree of uncertainty, the approach taken was to describe three possible scenarios depending on which of the 'toxic' effects was to be considered and then to derive an exposure limit for each scenario using different safety factors. However, the highest limit proposed, which was derived to protect workers from irritation on the assumption that formaldehyde is not a carcinogen, was well below a level that was considered realistic for industry to achieve given the ubiquitous occurrence of formaldehyde.

As described earlier, it is unclear how much weight was put on the document and/or its conclusions in determining either the nature of the regulation or the exposure limit. Before the affected parties can respond effectively or participate in the process, the basic assumptions must be clearly stated, i.e. the purpose of the regulation and whether the proposed regulation is designed to protect workers from the irritant effects of formaldehyde or from possible carcinogenic effects. Similarly, the nature and level of the exposure limit depend on the purpose of the regulation.

Following a 30-day comment period on the proposed regulation, the LRC recommended 'control of formaldehyde to the lowest practical level with a maximum airborne concentration of 1 ppm, conditions that will protect most workers from irritation'. Referring to the health effects document, it noted that a concentration of formaldehyde of 0.1 ppm was recommended to protect most workers from irritation and that 'concentrations lower by factors of 10 and 100 were proposed for control of formaldehyde as a non-genotoxic and as a genotoxic carcinogen respectively; the review indicates that there is positive evidence that formaldehyde is genotoxic'. However, later in the LRC summary report it is noted that environmental airborne concentrations may approach 0.1 ppm and that it would not be realistic to control strictly to this level (however) 'the extant guideline value in Ontario for formaldehyde is 2 ppm as a ceiling level; this is no longer considered appropriate'.[5]

From this series of statements it is still unclear to council whether the decision to designate formaldehyde was based on the possibility that it could cause cancer or on its irritant properties and whether the limit was determined by considering the health effects data or the economic feasibility.

The task force attempted to follow the logic from each of these premises:

1) If it were considered a potential carcinogen,
    - why was the exposure limit in the proposed regulation a ceiling value?;
    - why was the limit 100 or 1,000 times the limit proposed in the ministry's own health effects document? (The explanation given at the public meeting was that the health effects of formaldehyde are concentration-dependent not dose-dependent.)
2) If formaldehyde were being regulated on the basis of its irritant properties,
    - why focus on formaldehyde? – other irritants have not been considered for designation nor have other substances that cause severe acute health effects;
    - why choose an exposure limit at which a significant number of workers will still experience irritation?

The affected parties, in their comments, asked these questions and more, cited data to support their various positions and severely criticised the health effects document. Added to this questioning of both the health effects data and the rationale for designating formaldehyde was the issue of practicality and/or feasibility of compliance with the exposure limits. It appeared at the public meeting that there was some controversy about whether or not most industries were already complying with a 1 ppm exposure limit (see p.27 of Ref.1). Council considers that the issue of feasibility should have been analysed and discussed with the affected parties when the limit was initially considered for the proposed regulation and certainly before the second draft was presented at the public meeting. At the public meeting it was stated that 'the reason for the regulation and the exposure limit chosen is to protect most workers from irritation...' and the concern was that 'the irritation it causes, if uncontrolled, might possibly lead to the development of cancer.'

The controversy about the carcinogenic properties of formaldehyde was, at that time, fuelled by the release of the results of several epidemiological studies that failed to show an increase in the incidence of cancer in industrial workers exposed to formaldehyde. If the decision to designate were solely dependent upon the belief that formaldehyde was a potential carcinogen, it would be understandable that these data could present a dilemma for the ministry. The decision to designate had been taken and the process was well underway when the basic assumption was put into question. However, as carcinogenicity did not seem to be the sole reason for designating, it is hard to determine why it was decided that a reassessment of the health effects data was needed. It is assumed that the purpose was to determine whether a higher limit, which would be more easily achievable, would pose an increased risk to the health of workers, or alternatively, whether, due to the severe criticisms of the health effects document, the ministry needed to review its basic assumptions. Council's task force noted that the terms of reference for the expert panel, commissioned to reassess the health effects data, were not included in the background information provided to council. When the issue was raised at the meeting with ministry personnel (see Appendix I, Question 4), council was provided with a copy of the terms of reference.

Two of the concerns that led the task force to question the terms of reference were:

1) that the expert panel's report did not refer to, nor provide a critique of, the ministry's health effects document. This left the task force wondering whether the expert panel supported the approach or the assumptions/principles on which the ministry's analysis was based;
2) that the background documentation (p.31, Volume I) and the Notice dated June 19, 1986, which were sent to interested parties (see Figure 1), indicated that the expert panel had recommended a time-weighted-average (TWA) exposure limit of 1 ppm; however, it was not clear from the report that the panel was asked to recommend a limit, and, when the report mentioned a TWA of 1 ppm, it was worded that 'the available metabolic, pharmacokinetic and pathologic data in animals and/or man suggest a basis for an occupational exposure level of 1 ppm TWA.'

The terms of reference (see Appendix III) did not provide for the expert panel to recommend an exposure limit; however, they did ask that it critically review the health effects document [term of reference (1)] and determine whether the conclusions were still valid (4) and 'if the ministry should consider making changes to the conclusions of its health effects document'(5).

These terms of reference would tend to indicate that the purpose for this third review of the health effects was a questioning of the ministry's own document, especially if the purpose were not to recommend a limit based on the review. The report of the expert committee appeared to be an 'up-to-that-date' review of the literature and the conclusions appeared careful and well supported by the data. However, council notes with concern that the report did not address the terms of reference. Further it is unclear to council whether there was any communication between the ministry and the committee that could explain why the report did not address the terms of reference. This is of particular concern to council because of the confusion that has resulted from the parties not knowing whether the ministry's health effects document was still being used as a basis for the regulation and the exposure limits.

In response to a question on this issue, the ministry personnel indicated that their interpretation of the data had not changed and that the limit should be set at a level to protect workers from irritation, but, due to practical considerations, was set at 1 ppm TWA (see Appendix II, Question 1).

This leads council to conclude that the purpose of the expert panel's review was to determine whether a limit higher than that proposed and more practical to achieve (e.g. 1 ppm TWA) would increase the possible risk of cancer to exposed workers. This was a conclusion that could be drawn from the expert panel's report. It is noted that the expert panel pointed out that 'human experience has not indicated (any) short-term effects, *other than irritancy**, at mean levels of exposure of 1 ppm or below.' The circulation of the report to interested parties, with a letter asking whether the report changed the position of the parties with respect to designation, appeared to do little to dispel the confusion or lessen the opposition to designation.

However, it did indicate that there would be support from management for an exposure limit of 1 ppm TWA. This support appears to be consistent with the finding that the exposure levels in most industries were already below 1 ppm TWA.

Council focused its review on the process and rationale for setting limits without commenting on the levels. However, council notes that the exposure limit included in the proposed regulation submitted to council is the same as 'the extant guideline in Ontario', which was considered by the LRC in 1983 to be 'no longer appropriate'.

As indicated throughout this document, council has concern about the process used in developing the regulation and deriving the limit. The main concern focuses on the fact that the reasons for choosing formaldehyde as a high priority for designation and the purpose of the regulation were never clear to the affected parties. Nor were the reasons for appointing the expert panel clear. Council believes that if the panel were appointed to advise the minister as to whether a certain (economically feasible) limit would lead to an increase in the risk of cancer, this should have been clearly stated and discussed with the affected parties.

Another issue of concern to council is the inclusion of a different set of limits for new or reconstructed establishments. The reasons for this concern include:

1) the creation of inequities in the protection offered to workers in different facilities;

2) that such a distinction could act as a disincentive for companies to renovate existing, perhaps out-dated, facilities;

3) the implication that limits of 0.5 ppm TWA and 1 ppm ceiling value would be more protective, but because of practical considerations 1 ppm TWA and 2 ppm ceiling limits are acceptable.

If the ministry believes that the health of the worker would be better protected by the lower limit, council considers that the limit should be applied to all facilities. If necessary, consideration could be given to allowing time for implementation of the standard. The task force asked the ministry personnel the rationale for the 0.5 ppm TWA limit (see Appendix II, Question 9). The ministry's response led to a discussion of alternative means of allowing for lower limits when feasible — such as the ALARA principle or a provision similar to that included in the benzene designated substance regulation: that the exposure be 'reduced to the lowest practical level with a view to achieving not more than ...' Council expresses considerable concern about, what appears from the discussion to be, difficulty in enforcing such provisions (see Appendix II, Question 9).

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* *Emphasis added.*

In response to a suggestion by the task force that the provisions in section 5 could be used for the workplaces where it was not practical to reduce the exposure to a 1 ppm ceiling limit, ministry personnel pointed out that the workers would, under those circumstances, be required to wear respirators, and this was considered impractical. Council questions whether or not the respirators are considered to be necessary for the protection of the workers exposed to ceiling values between 1 – 2 ppm and why it would be impractical to have workers in 'old' establishments in respirators when, according to the proposed regulation, workers in new establishments with exposures in the 1 – 2 ppm ceiling range could be required to wear respirators.

As there was considerable controversy about whether formaldehyde should be the subject of a designated substance regulation and also about the basis for both designation and the limits, the task force asked whether the ministry had considered alternative means of requiring control of formaldehyde in the workplace. It appears from the response (see Appendix II, Question 9) that, at that time, no alternative was considered to be adequate. It is noted that several legislative changes have been made and/or proposed since then and council wonders whether the regulatory system is now sufficiently flexible to allow for alternatives to designation. Council recognizes that this is a generic issue but one that should be pursued.

It is understood that, before determining an exposure level to be used as a legally enforceable limit, consideration has to be given to the nature and extent of the adverse health effects that are anticipated to result from exposure at that level the feasibility and practicality of reducing exposures to the limit, and the economic impact. For this reason, the task force asked ministry personnel the rationale for conducting the plant visits so late in the development process, i.e. after a limit had been published in two different drafts of the proposed regulation (see Question 3, Appendices I and II).

With respect to the process of developing the regulation, council notes that the change in the limit from 1 ppm ceiling to 1 ppm TWA and the inclusion of a separate set of limits for new or reconstructed establishments as well as the change in the provision for medical surveillance were all made after formal opportunity for public comment.

The background information provided to council did not include a description of the process between March 1985 and June 1986. It appears from a discussion of this issue at the meeting between council's task force and ministry personnel that, during that period, there were at least two LRC meetings at which decisions were made that were relevant to the designation of formaldehyde. Council considers that this information is important and should have been included in the background material presented to council to aid council in its review of the process.

With respect to the changes made during the period between March 1985 and June 1986, the change in medical surveillance was made to all the DSRs at that time, and council has commented on this issue previously.[4],[6] The change to the exposure limit does not appear to have been discussed with the parties but could, perhaps, have been anticipated from the minister's letter circulated to interested parties with the report of the expert panel. However, the possibility of including a lower set of limits for new facilities was not indicated in any previous correspondence, does not appear to have been discussed with the parties and represents a new approach for the designated substance regulations.

Council has, in the past, expressed concern about major and/or substantive changes being made after the formal comment periods. It is noted that the Notice, dated June 19, 1986 and circulated to interested parties at the time the proposed designated substance regulation was submitted to council, described the major changes and, on previous occasions, ministry personnel have pointed out that the public can comment at any stage. However, council reiterates its position that, if the major and/or substantive changes are made late in the process, there should be consultation with the affected parties and/or formal opportunity for public comment.

LEGAL-TECHNICAL PROCESS

Council's task force identified several issues relating to the legal-technical process. Clarification was sought from ministry personnel, and the details of the questions, responses and discussion are included in Appendices I and II.

Section 3(1)

Ministry personnel explained that the regulation was intended to cover formaldehyde as a byproduct from an industrial operation but not the formaldehyde produced as byproducts incidental to industrial processes, e.g. cigarette smoke, exhaust from internal combustion, etc. It was noted, however, that monitoring techniques could not distinguish between the formaldehyde from the various sources. (See Appendix II, Questions 7 and 14.)

Section 4(1)

In response to a question from the task force, ministry personnel explained that although the maximum exposure limit would, according to the code, have to be determined over a minimum of a 15-minute interval, the limit was a maximum limit, and when the technology for instantaneous determinations of formaldehyde levels has been validated it could be included in the code.

Section 4(3)

The issue of the rationale and administration of this subsection was discussed (see Appendix II, Question 9). As described earlier, council expresses concern at the principle of including different limits for different workplaces and that this was done without public consultation.

Section 12(c) and 13(2)

The task force sought clarification about the exposure records that are required to be kept for five years and the records that need to be kept for at least 40 years (Appendix II, Question 12). Council notes that the distinction may not be clear. The issue appears to be further complicated by the difficulties involved with monitoring worker exposures using the present technology, as specified in the code, (see Appendix II, Question 13).

The task force also asked about the significance of the changes made to the Code for Measuring Airborne Formaldehyde — see Appendices I and II, Questions 10 a)–c) for a discussion of this issue.

Council suggests that, even when methods are validated by the ministry's laboratories and the precision and factors of accuracy are included in the code, the origin of the methods be referenced.

The discussion of other issues relating to the legal-technical process is included in Appendix II.

References

1. *Occupational Health Implications of the Use of Formaldehyde in Ontario*, prepared by Michael Holiday and Associates, July 1980.
2. *The Report to the Advisory Council on the Designation of Formaldehyde in Ontario, Vol. 2*, prepared by Occupational Health and Safety Division, April 1986.
3. *Formaldehyde Toxicity — Proposed TWA Exposure Criterion*, prepared by Special Studies and Services Branch, Ministry of Labour, July 1983.
4. Advisory Memorandum 85-V: A Review by the Advisory Council of the Process Used to Develop a Standard for Arsenic and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Arsenic Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Eighth Annual Report, Vol. I*, April 1, 1985 to March 31, 1986.
5. Recommendation of the Legislative Review Committee dated September 16, 1983.
6. Advisory Memorandum 86-I: A Review by the Advisory Council of the Process Used to Develop a Standard for Ethylene Oxide and Council's Evaluation of the Criteria Used to Assess the Hazard of Ethylene Oxide Exposure in the Workplace, to be published in *Advisory Council on Occupational Health and Occupational Safety, Ninth Annual Report*, April 1, 1986 to March 31, 1987.

APPENDIX I

Agenda for Discussion at the October 31, 1986 Meeting between Ministry Personnel and Members of the Task Force on Principles and Procedures for Setting Standards and Regulations (Subcommittee on Formaldehyde)

Consultative Process

1. What was the rationale for deciding to designate formaldehyde (and why was it considered a higher priority than other environmental/ occupational contaminants?)?
2. The health effects document is dated July 1983 and the proposed regulation was published in July 1983. Was the proposed regulation based on the analysis of the health effects presented in the document?
3. What was the purpose of the plant visits in early 1984 (after the public meeting)?
4. What were the terms of reference for the expert committee? (How and why was the committee appointed?) Were the affected parties informed of the process?
5. Why was there a 1¼-year delay between the receipt of the comments on the committee report and the revised regulation being submitted to council? (What transpired in this period?)

Analytical Process

6. a) What are the criteria for determining whether a substance is a carcinogen or not?
   b) Do positive animal data take precedence over negative human data?
   c) Did the determination of whether to designate formaldehyde depend on whether or not it was considered to be carcinogenic?

Legal–Technical Process

7. Does section 3(1) 'a material containing formaldehyde is produced, handled or stored ...' include byproducts of processes, such as formaldehyde in the smoke from an internal combustion engine? If so, are there any cut-off concentrations below which the regulation would not apply (e.g. less than 0.1 percent)?
8. Is the MEL in section 4(1) really a maximum or is it a short-term exposure limit?
9. a) What is the rationale for including section 4(3) in this regulation?
   b) Where did the recommendation for a TWAEL of 0.5 ppm come from?
   c) Was there any public consultation on the inclusion of this provision?
10. a) What was the basis for the change in the method for determining formaldehyde in air sampling solutions?

b) Has the method been validated?

c) What are the references (should they not be quoted in the Code)?

11. As section 3(1) now specifies that materials containing formaldehyde are included in the regulation, should not section 6(2)(a), the assessment, include methods and procedures ... for materials containing formaldehyde?

12. What is the rationale for requiring that the records of the exposures of workers be kept for five years in section 12(c) and for at least 40 years in section 13(2)?

13. Does the requirement in section 11 'that the procedures for monitoring, sampling and determining ... the exposure of a worker ... be those in the Code' imply that personal sampling should be performed according to a modification of the method described in the Code or that representative air samples can be used to estimate a worker's exposure for the purposes of complying with the requirements of section 4(1), (2) and (3)?

14. How can formaldehyde from second-hand smoke be separated from formaldehyde from other sources within the workplace? How much formaldehyde could be accounted for by second-hand smoke?

APPENDIX II

Summary of the Responses to Questions Raised at the October 31st, 1986 Meeting between Ministry Personnel and Members of the Task Force on Principles and Procedures for Setting Standards and Regulations (Subcommittee on Formaldehyde)

Question 1.

It was explained that formaldehyde was on the original priority list developed in 1977-78. The CIIT study and two subsequent studies that demonstrated that formaldehyde was carcinogenic in rats brought formaldehyde forward as a high priority for control.

A task force member asked whether the ministry's position that it was a high priority had changed since the results of the extensive epidemiological studies had been published, or whether the ministry considered positive animal studies to take precedence over negative human studies.

The ministry responded that they were not convinced that formaldehyde is not carcinogenic to man. When asked about the risk (i.e. the number of deaths it could cause relative to other factors such as cigarette smoking, exposure to asbestos, etc.), the ministry responded by describing two approaches to carcinogencity:

1) A functional definition, i.e. black box: agent in – cancer out, then the agent is considered a carcinogen.
2) A mechanistic approach, i.e. consideration of whether the agent induces cancer (then it is considered a carcinogen) or modifies or influences the incidence of cancer (then it is considered a promoter).

It was explained that the criteria for determining whether a substance is a carcinogen (question 6a) must include an assessment of the mechanism of action. In the case of formaldehyde, the presence or absence of cytotoxicity was considered to be an important determinant of whether or not it would induce cancer. Other factors that should be considered include mutagenicity tests, the ability to bind to DNA (forming DNA adducts) and epidemiological studies. It was noted that both EPA and IARC are revising their classification schemes for carcinogens to include mechanistic considerations.

For formaldehyde, the carcinogenic response appears to be seen following induction of cytotoxic effects (commonly referred to as irritation) — the degeneration of cells and hyperplastic repair at the point of impingement. Although the short-term mutagenicity tests are positive, the significance has been questioned because formaldehyde is present endogenously and because *in vivo* formaldehyde rapidly binds to protein. It was summarized that it had been considered that if the formaldehyde exposure were so low that it would not induce cytotoxicity, it probably would not function as a carcinogen.

The standard originally recommended by the ministry had been based on a level below which there would be no irritation or cytotoxic effects seen in humans. It was assumed that, at this level, there would also be little or no cancer risk.

In response to a question about the distinction between irritation and cytotoxic effects, a ministry official explained that one was subjective and the other objective. The burning sensation without evidence of cytotoxicity was considered subjective. He considered the best evidence of cytotoxicity was cilia stasis, which meant that the mucous blanket could not be moved. This would indicate that the chemical had reached the cytoplasm and had interfered with the function of the cells. The next indicator would be obvious cytotoxicity or cell death, followed by hyperplasia (required for repair).

A task force member asked whether consideration had been given to the recent large epidemiological study by Blair. Like previous epidemiological studies, it was unable to show any evidence of a carcinogenic effect in humans. Consideration of these studies could influence whether designation should continue, and, if so, the exposure limit.

The task force member pointed out that, based on the studies, the upper bounds of the risk at 0.5 ppm, 1 ppm, and 2 ppm could be estimated. The ministry personnel responded that Blair's study was not published when the health effects document was prepared.

With reference to question 6b on the agenda for discussion (Appendix I), it was noted that EPA had published a 'Weight of Evidence Approach' in September 1986. With this approach, individual studies should be assessed and weighted separately according to the power of the study. The the final weight of evidence would be used to categorize a specific agent into a class A – E (A = human carcinogen – E = negative evidence). A copy of the chart from the September 1986 Federal Register was circulated (Appendix IV).

The chart was used to illustrate that EPA, as well as IARC, are now revising many of their definitions so that mechanisms of action are considered. It was pointed out that good epidemiological studies to categorize a substance into class A are very rare.

A ministry official indicated that, according to the weight of evidence approach, formaldehyde would probably be classified as B2 (a probable human carcinogen), i.e. sufficient animal data and negative human data. However, it was pointed out that the scheme had not been published at the time formaldehyde was being considered and it had not been decided whether or not the ministry plans to use the scheme in the future.

The response to Question 6b, whether positive animal data take precedence over negative human data, was summarized as 'It depends on the nature, quality and power of the specific studies.' With respect to the issue of the risk to humans, it was noted that the ministry had decided to go ahead with designation because the Blair study could not, alone, provide sufficient evidence to determine whether or not formaldehyde is a human carcinogen.

It was added that the carcinogenic effect of formaldehyde depends upon cytotoxicity. Hence, if exposure in humans is high enough to be cytotoxic, then it could be a human carcinogen.

A task force member expressed concern about the use of cilia stasis as an indicator of cytotoxicity and, especially in this case, as a precursor of carcinogenicity.

With respect to a question about whether the ministry had re-evaluated its position in light of the data from the recent epidemiological studies, ministry personnel responded that there was still support for a cytotoxicity threshold and the epidemiological studies did not influence this position. Reference was made to a study showing an increased incidence of naso-pharyngeal tumours in occupants of trailers where exposures to formaldehyde were high enough to cause cytotoxicity.

Regarding the recommendations from the health effects study (July 1983), ministry personnel explained that, at that time, the carcinogenic properties were not fully understood. Hence, the document described three possible scenarios, depending on the mechanism, and a level had been suggested for each scenario. It was hoped that future studies would elucidate the mechanism.

In response to the question of why the ministry used 1 ppm TWA as the level to control for irritancy when 0.1 ppm had been suggested in the health effects document, ministry personnel noted that the document was only advice and that one study that had been used to derive the estimate of 'no observable effect' (on cilia stasis) in humans was subsequently found to be flawed. Hence, the threshold for cilia stasis was probably higher.

Ministry personnel were asked whether they were regulating formaldehyde on the basis of its mechanism of action in animals and, if so, whether consideration had been given to the relevance of the animal models to humans — for instance, differences in sensitivity between different species (e.g. the rat is an obligatory nose breather, hence the effect may be site specific to the rat). A task force member suggested that if, from the Blair study, upper confidence limits were calculated for the risk associated with an exposure of 1 ppm, it would give assurance that a 1 ppm limit would be protective and it would provide a useful basis for considering the extensive data in the study. It was added that if such upper bounds were estimated in other cases, it would help avoid some of the concerns regarding the extrapolation of findings from animals to man.

Ministry personnel responded that, according to the weight of evidence approach of the EPA, all the epidemiological studies, positive and negative, would be assessed; then the epidemiological studies would not be such a useful tool. There was further reference to the positive studies, i.e. those of trailer occupants and of lung tumours in some English factory workers exposed to quite high (about 3 ppm) levels of formaldehyde. With respect to the differences between rats and humans and the obligatory nose breathing of rats, it was noted that in humans (who can breath through their mouths), the point of impingement could be considered to be the oral pharynx, and the tumours in the trailer study were in that region. It was acknowledged that the numbers were small and that the study was not powerful. A task force member pointed out that the two positive epidemiological studies referred to had serious flaws: one was not statistically significant and the other had confounding factors and was not corrected for smoking habits. Reference was made to the Decennial Supplement issued by the Registrar General in the United Kingdom, which indicated that the incidence of deaths from lung cancer could be increased by 15 percent by differences in smoking habits if studies were not prospective. The task force urged the ministry to review the studies critically. Reference was made to a paper that demonstrated the importance of distinguishing between administered and delivered doses when estimating the effect of low levels of formaldehyde. It was explained that all the risk analyses require extrapolation to lower doses, and the paper demonstrated that the various mathematical models used for extrapolation could vary by factors of 100 to 600 million if a mechanistic approach were taken, i.e. using delivered dose (compared to using the administered dose).

It was pointed out that risk extrapolation had not been used by the ministry because extrapolations indicate a degree of certainty in an area of great uncertainty. The preferred means of deriving limits was to commence with a 'no observable effect level' (NOEL) and then use a safety factor. It was pointed out that the evidence available for formaldehyde would not support the use of a dose-response relationship, so the ministry had used a reasonable threshold for subjective irritation. Subsequently, the expert panel had been asked to review the literature and give an opinion about what should be done with formaldehyde. The expert panel had concluded that a TWA of 1 ppm would not be an unreasonable level. The task force pointed out that that conclusion had specifically excluded irritancy. Ministry personnel reiterated that the level should prevent cytotoxic effects in humans and therefore should represent zero (or near zero) risk of carcinogenicity.

It was clarified that the task force's concern was the logic used for the development of the level rather than the level per sé. Data on cilia immobilization had been used to determine the NOEL; however, this did not necessarily represent an indicator of the cellular toxicity, which may be a precursor of the carcinogenic effect.

Ministry personnel noted that in the LRC summary report and at the public meeting it was stated that formaldehyde was being designated because of its irritant effect, and this referred to the subjective irritation caused by formaldehyde.

In response to a question about how to determine a level for subjective irritation, ministry personnel responded that there is a great deal of literature dealing with irritancy. A task force member pointed out that at 1 ppm TWA a significant number of workers will suffer from subjective irritation. It was clarified that, when a number is included in a regulation, factors other than the health effects and the recommendation of the Special Studies Branch have to be considered. Initially, a limit of 1 ppm ceiling was proposed, but because of the evidence that a 1 ppm ceiling was not a practical limit in some workplaces in Ontario, a 1 ppm TWA was used.

Question 2.

Ministry personnel responded that the contents of the health effects document were reviewed and discussed in the ministry before the draft regulation was published. It was clarified that the document had not been peer reviewed. However, since that time, council offered advice on this topic and now the health effects documents are published before the draft regulation and, if possible, before the Notice.

There was a question about the procedures used by the ministry for incorporating new data into the reviews and decision–making process. It was explained that the consultative process has numerous stages requesting briefs, comments, etc. At each stage there is the opportunity for parties to provide new data, and the ministry continually reviews the literature and developments in other parts of the world.

Question 3.

It was explained that the purpose of the plant visits was to investigate further the opposition to designation and the practicality of achieving the limit proposed. The parties expressing most concern were hospitals, particle and waferboard manufacturers, and foundries. The plant visits indicated that, for various reasons, such as existing conditions of the physical plant, type of work, etc., some hospitals and one foundry would not be able to meet a 1 ppm ceiling. In response to a question from the task force, it was explained that the plants visited were selected because respondents had indicated difficulties in achieving the levels. With respect to the hospitals, it was explained that the respondent was the OHA (Ontario Hospital Association), not one individual hospital.

There was a brief discussion of the types of problems, e.g. the physical plant and lack of money for making renovations, etc. In response to the suggestion that such cases could be covered under section 5, it was pointed out that the workers would then be required to wear respirators.

There was a question about whether or not there had been any worker involvement in the plant visits and it was explained that the plant visits in question had not been routine visits by field consultants. Two ministry officials had visited the plants, making a special effort to talk to workers on the shop floor in an attempt to identify concerns about formaldehyde and identify whether the workers were experiencing any ill-effects from their work with formaldehyde. In response to further questions it was clarified that the plant visits had not included talking with the joint health and safety committees, and that unionization had not been taken into consideration in deciding which plants to visit. However, some of the workplaces were unionized and others were not.

It was explained that hospitals, foundries and particle and waferboard manufacturers were three of the largest users of formaldehyde (where the worker exposure is most significant). With respect to the timing of the plant visits, it was explained that the consultants (Michael Holiday and Associates) surveyed the uses and users, exposures, controls, etc. and met directly with affected parties. This information formed the basis of their report, which was submitted to the ministry prior to the decision to publish the Notice of Intention to Designate.

In response to a question about whether the issue of practicality was addressed in the consultant's report, it was pointed out that before a specific limit is suggested it is difficult to discuss practicality;however, there was an analysis of the general issues. Most industries contacted did not appear to have a problem with worker exposure when the limit was a 2 ppm ceiling. When asked whether the consultant's survey of industries included hospitals, it was noted that, from the appendix to the survey, it appeared that hospitals were not surveyed, but the number of exposed workers in laboratories could possibly have included those in hospitals. The task force suggested that, if practicality were going to be such an important issue, it should have been considered at the time that the limit was set initially. In response, it was noted that the process started many years ago and the ministry has now changed its approach. It was also pointed out that some parties have been very reticent to provide the ministry with information on the practicality of proposed limits until the late stages of the consultative process.

Question 4.

The terms of reference for the expert panel were read (Appendix III), and ministry personnel agreed to provide council with a copy. It was explained that recommendations for members had come from Special Studies Branch and were reviewed with the Assistant Deputy Minister. Factors taken into consideration included the importance of having an objective, outside review and that both sides of the issue should be represented with a 'neutral' third party. Affected parties had not been specifically informed that the expert panel was being appointed. However, when the report was received, it was circulated to affected parties for comment, and the parties were asked whether or not their positions on the designation had changed after reviewing the report.

Ministry personnel explained that the intense opposition to the designation of formaldehyde was an important consideration in deciding to reassess the health effects literature; hence, it was important to know whether the reassessment by outside experts had changed the positions of those opposing the regulation. There was a brief discussion of this issue and of whether the objective of the report was to determine whether or not the substance should be designated or whether it was to recommend a limit.

A task force member commented that, at the time the expert panel was appointed, the parties did not know whether or not the report would be made public.

Ministry personnel explained that, as the process becomes protracted and new information becomes available, variations on the process may become necessary. There was a discussion of other examples of variations in the process, and the task force pointed out that, for noise and ethylene oxide, the variations were well publicized and openly discussed.

Question 5.

The sequence of events was outlined as follows:

- the expert panel report was received in January 1985;
- there was an LRC meeting to review the findings, and it was decided to circulate the report;
- the comments were received and reviewed;
- with the knowledge that the positions of the parties had not changed, various alternative procedures (e.g. regulation – not designation) were considered by the LRC;
- the LRC decided that a more thorough analysis of the issues was needed and that the legal status of regulations, other than designation, had to be investigated;
- such deliberations occurred through the summer and fall of 1985; and then,
- the government changed;
- reassessment was required; and, in January 1986,
- a decision was made to proceed;
- a revised regulation was drafted in March and approved by the – LRC; and
- the report to council was prepared and submitted to council in June 1986.

It was suggested that, in future, it would be helpful if council were provided with this type of background information.

Question 6.

It was agreed that the questions in this section had already been dealt with under Question 1.

Question 7.

Ministry personnel explained that it was not the intention of the regulation to deal with formaldehyde formed as a byproduct. The term 'produced' was meant to include things produced for use, not formaldehyde in engine exhaust or cigarette smoke. In a discussion of this issue it was pointed out that exhaust was part of the work environment; however, other components of the exhaust would probably be used as an indicator of potentially toxic levels, e.g. carbon monoxide, carbon dioxide or polycyclic hydrocarbons. It was pointed out that in workplaces where internal combustion motors have been an issue, the levels of carbon monoxide would exceed the standard long before formaldehyde became a problem and that, generally, carbon monoxide in the exhaust is used as a measure of the state of maintenance of a motor. There was a discussion about whether or not measurements of formaldehyde generated as byproducts from such processes had been collected and whether they were easily retrievable. The ministry responded that values for cigarette smoke were available, but that others were not easily retrievable.

Ministry personnel noted that a new regulation for the control of hazardous chemical and biological agents in the workplace would apply to any hazardous contaminant in the workplace and there are exposure limits for the substances listed in the schedule. It was anticipated that the exposure limits for the most toxic substance would be used for controlling things like exhausts — not the formaldehyde regulation. It was pointed out that in workplaces where formaldehyde was handled or produced (for use), it would be impossible to separate how much formaldehyde came from each of the various sources.

Ministry personnel noted that the application section of a regulation is the most difficult to write and that the ministry would welcome council's advice on this issue.

Question 8.

It was explained that the level of 2 ppm was intended to be a maximum, not a short-term exposure limit (STEL). The task force pointed out that the Code recommends a 15-minute minimum sampling time. Ministry personnel responded that for the wet-sampling technique specified in the Code, 15 minutes is a reasonable minimum sampling period. There are, however, instruments under development that will allow shorter sampling times, and it is possible that the Code could be amended to include other methods when they are validated. This led to a discussion about direct-reading instruments and the interferences experienced. As formaldehyde is an irritant, the ministry expressed concern with respect to having the maximum measured over a 15-minute interval. To avoid abuses, efforts were being made to validate a technique to measure absolute maximum concentrations. It was clarified that a STEL, as used by ACGIH, has a very specific interpretation, which goes beyond a level measured over a 15-minute period. It is limited to four times a day with at least an hour in between each excursion and the only designated substance regulations that include a STEL are lead and mercury. A ministry official pointed out that using the strict interpretation of a STEL makes it virtually unenforceable.

Question 9.

In explaining the rationale for section 4(3), it was noted that, at exposure levels below 2 ppm, some workers will experience subjective irritation. However, a 1 ppm ceiling, which would have prevented most workers from subjective irritation, was not practical for some workplaces in Ontario. As it appeared that a 1 ppm ceiling would be feasible for new workplaces, it was considered prudent that levels in new or reconstructed workplaces should be controlled to the limits initially proposed. Such an approach has also been used in Sweden and Denmark. Ministry personnel pointed out that in the workplaces where it is feasible to control formaldehyde, the levels are well below 1 ppm ceiling. A task force member asked whether this unequal protection under the regulation could stand up to a challenge under the Charter of Rights. It was considered to be an interesting question for the Legal Branch.

In response to a question, it was explained that the minister feels very strongly that workers in the province should be protected to the greatest extent possible. He also feels that the exposure limits should be feasible (i.e. should not shut down plants). Hence, it was considered desirable to set a limit to protect workers but still allow workplaces to stay in business and, if new plants being built could offer greater protection to workers, they should be required to do so.

It was noted that council had, at one stage, considered a similar proposal for the control of carcinogens; however, it was concluded that such a requirement could act as a disincentive for employers to build new plants and/or to upgrade existing facilities. There was reference to section 4 of the designated substance regulation on benzene, where the limit included 'with a view to achieving' (a lower limit) as well as ALARA. In response to a question about whether such an alternative had been considered, ministry personnel explained that the minister considers that regulations have to be enforceable and that it would appear that 'with a view to achieving...' is not an enforceable standard. When questioned about ALARA, it was noted that Legal Branch feels that ALARA is not an enforceable standard; however, it would appear that it had never been tested.

In response to a question about the preferable limit, ministry personnel noted that the 1 ppm ceiling was the limit originally proposed. The 0.5 ppm TWA was considered to be a value that would provide a higher degree of protection because it would prevent a worker from being exposed to a level just below the ceiling for long periods of time. It was noted that there had not been any public consultation on this section; however, the 1 ppm ceiling was orginally proposed and the comments received on the early drafts and the concerns expressed were related to the practicality of meeting the limit. There had been extensive deliberations about the limit and, because the regulation had been in the process of development for a long time, it was decided not to extend the consultative process any further.

Question 10.

It was explained that the change in the Code was a change in the procedure for standardization. The previous method involved several titrations, was quite laborious and, hence, more error-prone. The new method was published during the process of developing the regulation and was validated by NIOSH and used by the Occupational Health Laboratory.

The task force suggested that the method should reference NIOSH, but it was pointed out that the Occupational Health Laboratory had validated the method and the accuracy and precision data are provided in the Code.

Question 11.

It was acknowledged that 'a material containing formaldehyde' should have been included in section 6(2)(*a*).

Question 12.

Ministry personnel explained that the exposure measurements in section 12 are air sampling results, which could be area samples or personal samples for workers in an area and that section 13 refers to the exposure record of a specific worker, and this will include information on the worker as well as his specific levels of exposure and whether or not a respirator was used. As there is no mandatory medical surveillance, there is no requirement for medical records. If there were medical surveillance, the worker's exposure records would be part of the medical record. In the case of formaldehyde, there is the requirement to retain the exposure record for 40 years or more.

There was discussion of the wording in the two sections in an attempt to clarify the distinction between the specific exposure records of individual workers and the sampling results (which, under the control program, are required to be posted).

Ministry personnel reported that there is a committee in the ministry considering the wording of the regulations in an attempt to make them more easily understandable.

Question 13.

It was explained that, for the purposes of complying with section 4, specific worker exposure could be calculated from representative air sampling measurements. There was a brief discussion about the difficulties of using the wet method described in the Code for personal monitoring.

Question 14.

Ministry personnel explained that formaldehyde from cigarette smoke cannot be separated from formaldehyde from any other source. It was reported that, of the data the ministry had collected from office surveys (in response to complaints of second hand smoke or indoor air quality), the highest levels measured were 0.02 ppm and were often undetectable or in the range of 0.005 to 0.01 ppm. It was noted that some of the formaldehyde in those measurements could be from furnishings. Typical ambient levels could approach 0.01 ppm. The task force noted that the figures were surprisingly low when side-stream smoke contains 40 ppm. There was a brief discussion of the factors affecting the levels, e.g. dilution, ventilation etc.

APPENDIX III

TERMS OF REFERENCE FOR A PANEL TO REVIEW THE AVAILABLE INFORMATION ON THE HEALTH EFFECTS OF OCCUPATIONAL EXPOSURE TO FORMALDEHYDE

1. Critically review the health effects document prepared by Special Studies and Services, "Formaldehyde Toxicity; Proposed TWA Exposure Criterion".

2. Review the formaldehyde literature published since the completion of the health effects document (see attached list with copies provided).

3. Review the public comments received on the formaldehyde health effects document prepared by Special Studies and Services Branch and comment on the validity of any criticisms made.

4. Determine whether the conclusions given in the Special Studies and Services Branch are still valid.

5. Determine if the Ministry should consider making changes to the conclusions of its health effects document.

DOCUMENTS TO BE REVIEWED BY EXTERNAL EXPERTS

1. Formaldehyde Toxicity: Proposed TWA Exposure Criterion by Dr. D. H. Harding, Special Studies and Services Branch.

2. Public briefs (and attachments) received which commented on the Special Studies and Services Branch's health effects document.

3. Report on the Consensus Workshop on Formaldehyde held at Little Rock, Arkansas, October 3-6, 1983.

4. U.S. EPA Formaldehyde: Determination of Significant Risk and the Advanced Notice of Proposed Rulemaking for Formaldehyde, in the May 23, 1984 Federal Register, pp 21870-21897.

5. Recent literature published since the health effects document was written:

   a) D. Siegel, V. Frankos and M. Schneiderman. Formaldehyde Risk Assessment for Occupationally Exposed Workers. Regulatory Toxicology and Pharmacology, 3, 355-371 (1983).

   b) J. Harrington and D. Oakes. Mortality study of British pathologists 1974-1980. Br. J. Ind. Med. 1984; 41: 188-191.

   c) T. Liebling, K. Rosenman, H. Pastides, R. Griffith, S. Lemeshow. Cancer Mortality Among Workers Exposed to Formaldehyde. Am. J. Ind. Med. 5:423-428, 1984.

   d) E. D. Acheson, et al. Formaldehyde in the British Chemical Industry: An Occupational Cohort Study. Lancet 1, no. 8377, 611-616 (1984).

   e) H. d'A. Heck, M. Casanova-Schmitz. The Relevance of Disposition Studies to the Toxicology of Formaldehyde CIIT Activities, 4(5). 1, 3-5 (1984).

   f) The submission of the Chemical Industry Institute of Toxicology to the U.S. EPA in response to the EPA request for comments on formaldehyde, published in the Federal Register November 18, 1983.

   g) C. D. Barrett, M. R. Stenzel, L. J. Enders, J. J. Clary. Considerations in Establishing an Appropriate TLV for Formaldehyde. A Presentation to the ACGIH Subcommittee on January 20, 1983.

6. Papers presented at the American Chemical Society Symposium on Formaldehyde Toxicology, April 9-12, 1984, St. Louis, Mo.:

   a) J. Todhunter. Formaldehyde: Refining the Risk Assessment

   b) J. J. Clary. Formaldehyde Risk Analysis

   c) T. B. Starr, J. E. Gibson, C. S. Barrow, et al. Estimating Human Cancer Risk from Formaldehyde: Critical Issues.

and well-conducted animal studies in different species.

The classifications "sufficient evidence" and "limited evidence" refer only to the weight of the experimental evidence that these agents are carcinogenic and not to the potency of their carcinogenic action.

C. Categorization of Overall Weight of Evidence for Human Carcinogenicity

The overall scheme for categorization of the weight of evidence of carcinogenicity of a chemical for humans uses a three-step process. (1) The weight of evidence in human studies or animal studies is summarized; (2) these lines of information are combined to yield a tentative assignment to a category (see Table 1); and (3) all relevant supportive information is evaluated to see if the designation of the overall weight of evidence needs to be modified. Relevant factors to be included along with the tumor information from human and animal studies include structure-activity relationships; short-term test findings; results of appropriate physiological, biochemical, and toxicological observations; and comparative metabolism and pharmacokinetic studies. The nature of these findings may cause one to adjust the overall categorization of the weight of evidence.

TABLE 1.—ILLUSTRATIVE CATEGORIZATION OF EVIDENCE BASED ON ANIMAL AND HUMAN DATA [1]

Human evidence	Animal evidence				
	Sufficient	Limited	Inadequate	No data	No Evidence
Sufficient	A	A	A	A	A
Limited	B1	B1	B1	B1	B1
Inadequate	B2	C	D	D	D
No data	B2	C	D	D	E
No evidence	B2	C	D	D	E

[1] The above assignments are presented for illustrative purposes. There may be nuances in the classification of both animal and human data indicating that different categorizations than those given in the table should be assigned. Furthermore, these assignments are tentative and may be modified by ancillary evidence. In this regard all relevant information should be evaluated to determine if the designation of the overall weight of evidence needs to be modified. Relevant factors to be included along with the tumor data from human and animal studies include structure-activity relationships, short-term test findings, results of appropriate physiological, biochemical, and toxicological observations, and comparative metabolism and pharmacokinetic studies. The nature of these findings may cause an adjustment of the overall categorization of the weight of evidence.

The agents are categorized into five groups as follows:

Group A—Human Carcinogen

This group is used only when there is sufficient evidence from epidemiologic studies to support a causal association between exposure to the agents and cancer.

Group B—Probable Human Carcinogen

This group includes agents for which the weight of evidence of human carcinogenicity based on epidemiologic studies is "limited" and also includes agents for which the weight of evidence of carcinogenicity based on animal studies is "sufficient." The group is divided into two subgroups. Usually, Group B1 is reserved for agents for which there is limited evidence of carcinogenicity from epidemiologic studies. It is reasonable, for practical purposes, to regard an agent for which there is "sufficient" evidence of carcinogenicity in animals as if it presented a carcinogenic risk to humans. Therefore, agents for which there is "sufficient" evidence from animal studies and for which there is "inadequate evidence" or "no data" from epidemiologic studies would usually be categorized under Group B2.

Group C—Possible Human Carcinogen

This group is used for agents with limited evidence of carcinogenicity in animals in the absence of human data. It includes a wide variety of evidence, e.g., (a) a malignant tumor response in a single well-conducted experiment that does not meet conditions for sufficient evidence, (b) tumor responses of marginal statistical significance in studies having inadequate design or reporting, (c) benign but not malignant tumors with an agent showing no response in a variety of short-term tests for mutagenicity, and (d) responses of marginal statistical significance in a tissue known to have a high or variable background rate.

Group D—Not Classifiable as to Human Carcinogenicity

This group is generally used for agents with inadequate human and animal evidence of carcinogenicity or for which no data are available.

Group E—Evidence of Non-Carcinogenicity for Humans

This group is used for agents that show no evidence for carcinogenicity in at least two adequate animal tests in different species or in both adequate epidemiologic and animal studies.

The designation of an agent as being in Group E is based on the available evidence and should not be interpreted as a definitive conclusion that the agent will not be a carcinogen under any circumstances.

V. References

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February 29, 1988

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 11th Floor
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Dear Dr. McCalla:

Thank you for your letter of September 28, 1987 forwarding a copy of Advisory Memorandum 87-IV, Council's review of the process used to develop the proposed formaldehyde regulation. Without doubt, the proposed designation of formaldehyde has been controversial. Council, in carrying out its careful analysis of the issue and rigorous questioning of the regulation development process, has provided an opportunity for reconsideration of the decision to designate formaldehyde. This opportunity is welcomed and greatly appreciated.

Council has been highly critical of the process followed in proposing the designation of formaldehyde and in developing the proposed regulation. In analyzing Council's criticisms, my officials came to the conclusion that Council's specific questions and comments could not be addressed without examining Council's underlying criticism that the Ministry either did not have a rationale or had failed to effectively communicate what the rationale for designating formaldehyde was. This examination revealed that, while the Ministry's rationale was clearly articulated many times during the designation process, there were inconsistencies in the interpretation of the health effects data that developed over time and undoubtedly led to confusion. This resulted in large part because of the rapid growth in the formaldehyde health effects literature. In retrospect the decision to initiate the designation of formaldehyde may have been premature.

Clearly there is now less reason for proceeding with the designation of formaldehyde than there was in 1986 when Council initiated its review. Since the proposed formaldehyde regulation was submitted to Council, the Regulation respecting Control of Exposure to Biological or Chemical Agents, O. Reg. 654/86, has come into effect. This regulation may have been one of the legislative changes referred to by Council in suggesting that the regulatory system is now sufficiently flexible to allow for alternatives to designation. My officials considered control of worker exposure to formaldehyde through O. Reg. 654/86 and have concluded that it provides a viable alternative to regulation through designation. It prescribes the same exposure limits as would the proposed formaldehyde regulation.

In considering alternatives to designation, my officials also noted the following conclusion in the report of the expert panel on formaldehyde:

> Because of its irritant properties, it is unlikely that humans would be exposed to sufficient concentrations of formaldehyde over periods long enough to induce the tissue damage and the subsequent sequelae predisposing to the pattern of carcinogenesis observed in animals. Human experience has not indicated short-term effects, other than irritancy, at mean levels of exposure of 1 ppm or below.

Clearly, the expert panel did not consider formaldehyde exposure to be a significant carcinogenic risk. If this conclusion is accepted, there remains very little justification for designation provided there is some mandated control of formaldehyde exposure. O. Reg. 654/86 provides this control. My officials have therefore recommended that the designation of formaldehyde not proceed and that workplace exposure to formaldehyde should be regulated at this time through O. Reg. 654/86. I have accepted this recommendation and plan to refer the issue to the newly established Joint Steering Committee on Hazardous Substances in the Workplace.

Other issues raised by Council have been addressed by my officials and are included in the attachment to this letter. I would like once again to thank the members of Council for their assistance in dealing with a most difficult and controversial issue.

Yours truly,

Gregory Sorbara
Minister

Attachment

REGULATION RESPECTING FORMALDEHYDE

Summary and Response to Other Issues Raised by the Advisory Council

Occupational Health and Safety Division
January 15, 1988

REGULATION RESPECTING FORMALDEHYDE

Summary and Response to Other Issues Raised by the Advisory Council

Issue 1 **There is no record of the decision to designate; it appears the decision was, at least in part, a response to pressure and to media coverage of potential carcinogenicity of formaldehyde.**

Council points out that with other designated substances the decision to designate has been based on a recommendation from the LRC. Council also notes that a summary report of the LRC was included in the background information provided to Council. Although the LRC summary report explains that the rationale for designation was to protect workers from formaldehyde's irritating effects, Council states there was no record of the decision to designate. From this Council concluded that the Ministry was responding at least in part to public pressure.

Council may have been confused by the date of the LRC's summary report, which was September 16, 1983 almost seven weeks after the publication of the proposed regulation on July 30, 1983. In fact, an LRC report was issued at the time the proposed regulation was published but it was subsequently withdrawn to correct errors in some of the technical data it contained. Notwithstanding the date of the summary report, the recommendations included in it were made before the proposed regulation was published on July 30, 1983.

The Ministry officials disagree with Council's implied disapproval of the Ministry's decision to designate as a response to pressure. Where workers are concerned that their health may be at risk, the Ministry has a duty to respond. At the time there was legitimate concern about formaldehyde's carcinogenic potential. Ministry officials studied the problem and concluded that the data on the formaldehyde cancer risk to humans were not good enough to provide a rationale for designation. But the data that were available did suggest that at non-irritating levels of exposure, any cancer risk would be minimal. Designation with the objective of preventing irritation was therefore proposed.

Issue 2 **It is unclear how much weight was put on the (health effects) document in determining either the nature of the regulation or the exposure limit.**

Council notes that the date on the health effects document was eight months after the publication of the Notice of Intention to Designate and that its title (Formaldehyde Toxicity-Proposed TWA Exposure Criterion) implies that its purpose was to recommend exposure limits. Without going into details, Council expresses concern about the health effects document, presumably referring to its quality. The document is inconclusive and recommends three different limits based on three interpretations of the health effects literature. Council points out that the exposure limit chosen for the proposed regulation is ten times higher than the highest limit recommended in the health effects document. Council therefore concludes that it is "unclear" how the Ministry used the health effects document in making its decisions about formaldehyde. Council also points out that affected parties cannot participate effectively in the development process unless the Ministry's basic assumptions are clearly stated.

The LRC summary report of September 16, 1983 referred to the health effects document as follows:

> Based upon evaluation of the scientific literature, Special Studies and Services Branch recommended control to time-weighted average exposure concentrations of 0.1 ppm to protect most workers from irritation. Concentrations lower, by factors of 10 and 100, were proposed for control of formaldehyde as a non-genotoxic and as genotoxic carcinogen.

The LRC noted that data with respect to cancer in humans are inconclusive and that a 0.1 ppm limit would be impractical because it approached environmental levels. The limit that was chosen, 1 ppm, was described as a level that would protect most workers from irritation. The Ministry's basic assumptions do appear to have been clearly stated.

Issue 3 **It is still unclear to Council whether the decision to designate formaldehyde was based on the possibility that it could cause cancer or on its irritant properties.**

Council maintains that the LRC summary report sheds no light on the rationale for designation. Council also points out that neither basis for designation, carcinogenicity or irritation, provides a logical explanation for the Ministry's subsequent decisions. If potential carcinogenicity is the rationale why was the exposure limit not a time-weighted average and why was the limit chosen 100 or 1,000 times the limit proposed in the health effects document? If the rationale is irritation why was formaldehyde rather than other irritants chosen and why was the proposed limit a value where workers may still experience irritation?

Council's confusion in wondering whether formaldehyde's irritant or carcinogenic properties provide the basis for designation is understandable. For formaldehyde, irritation and carcinogenicity are not mutually exclusive effects. The current understanding of formaldehyde's toxic mechanism is that irritation is a precursor of carcinogenicity. If the irritant effects are prevented so will cancer. Thus part of the rationale in protecting workers from irritation was to eliminate the cancer risk.

Issue 4 **It is unclear whether the exposure limit was determined by considering the health effects data or economic feasibility. The feasibility issue should have been settled earlier in the process.**

Council has suggested that the exposure limit was selected on the basis of economic feasibility considerations conducted late in the development process. This is not the case. Since the purpose of the exposure limit is to protect the health of workers, health considerations provide the prime rationale for selecting an exposure limit. However, health effects criteria are not used to the exclusion of practical considerations. The exposure limit must be also achievable. The LRC summary report issued when the proposed regulation was first published explains that the 0.1 ppm limit which was recommended on the basis of health effects was raised to 1 ppm in response to considerations of practicality.

A study carried out for the Occupational Health Branch before the exposure limit was selected indicated that the 1 ppm exposure limit would be feasible in most industries. It is not possible to know the impact of the limit in every workplace. It is an important function of the consultative process to bring forward those parties who would experience undue hardship from a proposed regulation. This happened in the case of the proposed formaldehyde limit and Ministry officials investigated by meeting with the parties and visiting their plants. These investigations were made by necessity late in the process. However, the decision to raise the limit to 1 ppm (TWA) was not made on the basis of these consultations but on the basis of the report of the expert panel.

Issue 5 If carcinogenicity was not basis for designation why was reassessment of health effects by the expert panel required?

Council suggests, that if formaldehyde's irritant effects were the sole rationale for designation (as originally claimed by the Ministry) then a reassessment would not be necessary; formaldehyde's irritant effects are straightforward. However, after the public meeting carcinogenicity became part of the rationale. Opponents of designation were making two arguments. One, epidemiological studies failed to show that formaldehyde caused cancer in humans. Two, consideration of plausible mechanisms of formaldehyde's carcinogenicity suggested that workplace levels of exposure were not high enough to cause the irritation that would be a precursor of cancer. The irritation they were talking about was cytotoxic or objective irritation that resulted in observable tissue damage, not the subjective irritation, which occurs at a lower exposure level, that was referred to in the Ministry's health effects document. The role of such mechanisms and their implications in risk assessment had not been considered in the Ministry's health effects document. It was for this reason that the issue was referred to the expert panel.

Issue 6 Irregular Dealings with the Expert Panel

Council has hinted at irregularities in the Ministry's dealings with the formaldehyde expert panel. Specifically, Council suggests that the panel was prevented from fulfilling its terms of reference and that the panel's report was misrepresented by the Ministry as recommending a 1 ppm TWA exposure limit, to provide a health effects rationale for a limit already chosen on the basis of economic feasibility.

Council is mistaken in its conclusion that the purpose of the expert panel's report was to provide a rationale for a higher exposure limit. The panel's objectives were outlined in its terms of reference. It was the decision of the panel that it could best fulfill its responsibilities by selecting from the scientific literature data on which health effects decisions should be reached. It was the panel not the Ministry that initiated the deviation from the terms of reference. Any confusion on this point should have been clarified by Dr. Ian Munro, who served on both the expert panel and on Council's task force.

The following statement from the conclusions of the expert panel's report was interpreted by my officials as a recommendation for 1 ppm TWA exposure limit:

> The available metabolic, pharmacokinetic and pathologic data in animals and/or man suggests a basis for an occupational exposure level of 1 ppm TWA.

This statement was added by the panel in response to a request from my officials that the report should include a recommended exposure limit.

Council maintains that it is not a recommendation for a limit. Given that a recommendation was asked for and this is what was provided, the LRC believes that Ministry officials should not be faulted for thinking it was a recommendation.

Issue 7 **Council notes that the exposure limit included in the proposed regulation submitted to Council is the same as 'the extant guideline in Ontario' which was considered by the LRC in 1983 to be 'no longer appropriate'.**

The limits in the proposed regulation are not the same as the 1983 guideline. The proposed regulation prescribes limits of 1 ppm (TWA) with a 2 ppm maximum for established workplaces and 0.5 ppm and 1 ppm, for new or renovated workplaces. The 1983 guideline was a 2 ppm ceiling. The addition of a TWA limit makes for a more stringent standard.

Issue 8 **Different limits for new or reconstructed establishments.**

Council has three concerns with having lower exposure limits for new or renovated workplaces:

- it creates a double standard
- it is a disincentive for employers to renovate
- it implies that the lower limits are more protective and the higher limits are acceptable only because of practical considerations.

The lower limits were added for new and renovated workplaces in recognition of the facts that not all workers would be protected from irritation at the 1 ppm exposure level and that compliance with this level should be feasible in new workplaces. It should create no more of a double standard than the ALARA approach taken in other designated substance regulation, but unlike ALARA, prescribed limits would be enforceable. It is not expected that the added costs, if any, of complying with the lower limits would be of sufficient significance to act as a disincentive to the renovation of an existing workplace.

Issue 9 **The making of major changes to the regulation late in the process without providing opportunity for public comment.**

Council notes three significant changes:

- the change in the exposure limit from a maximum of 1 ppm to 1 ppm TWA
- the lower limits for new or reconstructed workplaces
- changes to the medical surveillance provisions.

Council has a valid concern that affected parties may not have an opportunity to comment on changes introduced in the regulation late in the development process. In the case of the three changes to the formaldehyde regulation there was ample opportunity for comment. The medical surveillance changes were based on Council's advice on criteria for mandatory medical surveillance. The issue of whether medical surveillance should be mandatory or voluntary originated with the development of the first designated substance regulations and has arisen on several occasions since. The position of interested parties on this issue has been discussed many times over the years. The notice that accompanied the expert panel's report, when it was distributed to the parties for comment, implied that a formaldehyde level of 1 ppm (TWA) was being considered as an exposure limit. The response that was received indicated support for such a limit. There was less opportunity for comment on the limits for new and renovated workplaces, 0.5 ppm (TWA) and 1 ppm (maximum). However, it should be noted that a maximum concentration of 1 ppm was the limit originally proposed for formaldehyde. In addition, when the proposed regulation was sent to Council, in June 1986, it was also distributed to the parties with a notice explaining the changes referred to by Council.

Advisory Memorandum 87-V

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

Office of the
Chairman

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400 University Avenue
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December 29, 1987

The Honourable Gregory Sorbara
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Sorbara:

On behalf of council I am pleased to enclose Advisory Memorandum 87-V. This document deals specifically with the issue of mandatory medical examinations and clinical tests for workers in cases where the employer or Chief Physician has reason to believe that a worker's health is likely to have been affected by occupational exposure to a specific (identified) substance.

During a meeting with ministry personnel, council's medical examinations task force became aware that the ministry was using certain criteria to determine the type of provision to include in the designated substance regulations, i.e. if the criteria were met, medical surveillance was included, if not, post-exposure medical examinations were required under the conditions specified. The criteria were said to be based on council's advice (Advisory Memorandum 85-II). Council is encouraged at the value placed on its advice, but wishes to express concern about the modifications made regarding the purpose and process of using the criteria.

In view of this and the decision by Mr. Wrye, the former Minister of Labour, not to accept council's recommendation to appoint an independent committee of experts to apply the criteria recommended in Advisory Memorandum 85-II, council has asked its task force on medical examinations to consider the criteria and the process currently being used by the ministry to determine whether or not medical surveillance should be mandatory.

I trust that you will find the enclosed advice helpful and that council's continued work in this field will also be of value to you.

If you wish to discuss any of these issues further, please let me know.

Yours truly,

D.R. McCalla
Chairman

Encls.

cc: G. Thompson
T. Millard

Advisory Memorandum 87-V to the Minister of Labour December 29, 1987

Concerning Mandatory Post-exposure Medical Examinations

INTRODUCTION

The legislative base for requiring medical examinations of workers is found in the *Occupational Health and Safety Act*. Section 15(1)(*h*) of the Act stipulates that an employer shall,

> 'where so prescribed, only permit a worker to work or be in a work place who has undergone such medical examinations, tests or X-rays as prescribed and who is found to be physically fit to do the work in the work place.'

Section 17(1)(*e*) stipulates that a worker shall,

> 'where so prescribed, have, at the expense of the employer, such medical examinations, tests or X-rays, at such time or times and at such place or places as prescribed.'

Commencing in 1981, provisions for 'medical examinations and clinical tests' of a worker were included in control programs required under the designated substance regulations.* These 'medical examinations and clinical tests' were required to meet the provisions of codes associated with each regulation and were specified components of the medical surveillance programs mandated in the regulation.

BACKGROUND

In its reviews of the process used in the development of the designated substance regulations, council has questioned the requirements for mandatory medical surveillance[1] and commented on various specific provisions that were included in the Codes for Medical Surveillance.[2]

In April 1986 council's task force that reviewed the proposed designated substance regulation respecting arsenic asked Ministry of Labour personnel the rationale for the mandatory medical surveillance provision contained in the proposed regulation. The task force was informed by ministry personnel that the provision had been replaced by a provision requiring medical examinations in cases where an employer or a worker believed that the health of the worker had been affected by exposure to arsenic (see

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* **For example, section 7(2)(*d*), Ontario Regulation 536/81 respecting Lead.**

Appendix I).* At that time council expressed concern that the process used to introduce the new provision had not included consultation with the affected parties.[3] Council also made a number of comments on the new provision.[4] Also without consultation, variations on this new provision were included in the Designated Substance Regulation respecting Ethylene Oxide and in Ontario Regulation 654/86 respecting Control of Exposure to Biological or Chemical Agents that were promulgated in March 1987 and November 1986 respectively. The new provision was also included in some of the proposed designated substance regulations.

In August 1987 council established a Task Force on Medical Examinations to review the requirements, application and interpretation of the Act and regulations with respect to medical examinations and clinical tests (see Appendix II for terms of reference and membership of the task force). Because council had previously submitted advice on the Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs,[5] the decision was made to limit, at least initially, the task force's deliberations to the requirement for post-exposure 'medical examinations' that is included in the recent designated substance regulations and regulation 654/86.

In September 1987 the task force met with ministry personnel to discuss the rationale and justification for the new provisions in the regulations requiring medical examinations and clinical tests.

INTERPRETATION

It appears from earlier communications and from the task force meeting with ministry personnel that the new provision for medical examinations was intended to replace the provision for mandatory medical surveillance. When the task force asked about the rationale and justification for the new provision, ministry personnel cited the benefits and advantages of medical surveillance and post-exposure medical examinations without appearing to distinguish between the two.

In this document the term 'new provision' refers specifically to the requirement for post-exposure medical examinations and tests that has been added to the recent designated substance regulations and regulation 654/86.

Council considers that such post-exposure medical examinations are distinct from the examinations and tests that are required by medical surveillance programs* and are also distinct from preplacement and periodic examinations of workers in cases where the health of a worker may affect the health and safety of others (such as the medical examinations required for crane and hoist operators).

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* **As the 'medical examinations and clinical tests' included in the 'new' provision can be required only when there is reason to believe that the worker's health may be affected by exposure, they are, for the purposes of this document, termed post-exposure medical examinations. It should also be clarified that council considers 'medical examinations' include medical history, physical examination and clinical tests when and if necessary.**

ANALYSIS

The task force approached its task by:

- analysing the benefits and/or advantages of *mandated*, post- exposure medical examinations and tests that are cited by proponents of the new provision;
- and analysing what the new provision adds to the systems that have already been established to deal with medical examinations of workers; and then,
- determining whether the advantages and benefits justify the inclusion of the new provision in any designated substance regulation.

Advantages and benefits of mandating medical examinations cited by proponents:

1) To check the efficacy and efficiency of controls.

   Council considers that the efficacy and efficiency of controls, especially engineering controls**, can best be assessed by environmental monitoring. Post-exposure examinations and clinical tests cannot assess the efficacy and efficiency of controls because the results depend upon absorption and may be affected by many other factors, some of which may be non-occupational.

   Even if post-exposure medical examinations could be used to check the efficacy and efficiency of control programs, council would not consider that to be sufficient justification to violate the basic freedom of choice of a worker by *requiring* in legislation a worker to undergo a medical examination.

   Furthermore, because the only feedback to the employer from the examination and tests is whether (because of an exposure to a particular substance) the worker is fit, fit with limitations or unfit for work in further exposure to the substance, the new provision does not provide the employer with data that would be effective for assessing the efficacy or efficiency of the controls.

2) To detect any adverse effect on the health of workers at an early stage.

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* The medical examinations and clinical tests that are required by medical surveillance programs are *part* of a pre-planned, ongoing program, while post-exposure medical examinations are a one-time response to a specific perceived problem.

** The designated substance regulations and regulation 654/86 require workers to be protected from exposure to a hazardous biological or chemical agent without requiring the workers to wear and use personal protective equipment.

Council considers that, if a worker is concerned about his or her health, the worker can go to his or her physician; and, if an employer is concerned, he or she can suggest that the worker undergo a medical examination and clinical tests. The issue is, 'should a worker *be required* to undergo medical examinations and tests?' If examinations and tests are for a worker's benefit and if the worker understands the risks and benefits, council considers that the decision to undergo examinations and tests must be the worker's except where the health or safety of others could be involved. Council can think of no instance in which mandatory medical examinations and tests following exposure to a chemical or biological agent would prevent a worker from becoming a risk to the health and safety of others.*

3) To educate the worker about the health effects of exposure to hazardous substances and precautions to be taken.

The *Occupational Health and Safety Act* requires an employer to 'provide information, instruction and supervision to a worker to protect the health or safety of the worker'. The requirements in the various designated substance regulations for a training program on the health effects of those substances are independent of any requirement for mandatory medical examinations or tests.

Health education is an essential part of any workplace health and safety program and, as such, a responsibility of the employer. It is not, and should not be, restricted to cases where medical examinations are required. Council believes that the health education received as part of a medical examination (in cases where a medical examination is performed) should be only to supplement and reinforce information and education received as part of the overall health and safety program. The purpose of health education should be to *prevent* deleterious health effects, i.e. it should be conducted before 'there is reason to believe that the worker's health is likely to be affected'. Therefore, council considers health education is not justification for mandating post-exposure medical examinations and tests.

What the provision adds to the systems that have already been established to deal with medical examinations of workers

The new provision adds:

1) a statutory requirement for a worker to undergo a medical examination that is outside the workers' compensation system;

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* Possible exceptions being instances involving:
  - assessment of fitness to perform essential duties (as opposed to fitness to continue working with a particular substance), and
  - infectious agents. Infectious agents are covered by the *Act respecting the Protection and Promotion of the Health of the Public* (section 22 provides the legislative base for a medical officer of health to require a person to submit to an examination by a physician if the medical officer of health is of the opinion that: – a communicable disease presents a risk to the health of others; or, – it is necessary in order to decrease or eliminate the risk to health presented by a communicable disease).

2) the requirement that the employer pay; and
3) power to the Chief Physician of the Ministry of Labour to require a worker to undergo a medical examination and tests.

Council considered each of these in turn:

1) The requirement for a worker to undergo a medical examination outside the compensation system.

   From the wording in the regulation it appears that the purpose of the provision for post-exposure medical examinations is to determine fitness to continue working in exposure to a specific hazardous substance.* The issue of fitness to work is obviously very important to the workplace parties. The purpose of the health and safety legislation is the protection of the health and safety of workers. The new provision, as written, is restricted to fitness to work after a worker has been affected by exposure to a specific biological or chemical agent, and to the determining of whether the worker is fit to continue working with that substance. It appears that this wording limits the new provision to compensable illnesses or to instances where a worker's health could be detrimentally affected by continuing exposure to the specific hazardous substance. There is a mechanism to deal with issues of compensable illnesses already in place under the *Workers' Compensation Act*. Where a worker's health may be detrimentally affected by continued exposure to the specific hazardous substance, council considers that the worker should be fully informed of the health effects including the possible effects of continued exposure. After receiving this information, the decision about whether or not to have a medical examination and tests should be made by the worker (if necessary, in consultation with health professionals).

   The issue of fitness to work goes beyond that of exposure to specific hazardous substances, and a number of mechanisms for the workplace parties to deal with the issue have already been established. It appears to council that neither management nor labour has been pressing for the inclusion of a provision such as section 8 of regulation 654/86 in the occupational health and safety legislation.

2) The requirement for the employer to pay.

   Council does not consider that requiring the employer to pay for post-exposure examinations is justification for the new provision. If a worker has a concern and wants a medical examination, its cost will be covered by OHIP. If the examination reveals an occupational illness, the cost will be covered by Workers' Compensation Board. If the employer has a concern about a worker's health, then the employer has an obligation to: advise the worker of the concern; provide the worker with the information that is necessary to help make an informed decision about whether or not to have a medical examination;

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* This was not among reasons cited by the ministry personnel in the meeting with the task force, but was included in a letter from Mr. Wrye, then Minister of Labour, in response to council's Advisory Memorandum 86-1.

and, to offer the worker a medical examination at the employer's expense.

3) Power to the Chief Physician of the Ministry of Labour.

After discussing instances where the Chief Physician might find it advisable for a worker to undergo a medical examination, council concluded that the Chief Physician, like the employer, could explain the situation to a worker and *request* a medical examination and tests. Council cannot imagine any situation that would justify the Chief Physician *requiring* a worker, against the worker's will, to undergo a medical examination and tests.

CONCLUSION

From the foregoing analysis, council has concluded that workers should not be required to undergo post-exposure medical examinations under the designated substance regulations nor regulation 654/86.

Under these circumstances it was considered that the remaining terms of reference of the medical examination task force do not have relevance to the new provisions for post-exposure medical examinations.

ACOHOS RECOMMENDATION 87-8

> that the Minister of Labour ensure that regulations under the *Occupational Health and Safety Act* not include provisions requiring workers to undergo post-exposure medical examinations.

References

1. Advisory Memorandum 81-I: A Review by the Advisory Council of the Process used to Develop a Standard for Lead and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Lead Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Fourth Annual Report, April 1, 1981 to March 31, 1982.*
Advisory Memorandum 83-I: A Review by the Advisory Council of the Process used to Develop a Standard for Isocyanates and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Exposure to Isocyanates in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Sixth Annual Report, April 1, 1983 to March 1984.*
Advisory Memorandum 84-III: A Review by the Advisory Council of the Process used to Develop a Standard for Acrylonitrile and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Acrylonitrile Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Seventh Annual Report, April 1, 1984 to March 31, 1985.*
Advisory Memorandum 85-V: A Review by the Advisory Council of the Process used to Develop a Standard for Arsenic and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Arsenic

Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Eighth Annual Report, April 1, 1985 to March 31, 1986.*

2. Advisory Memorandum 81-I: A Review by the Advisory Council of the Process used to Develop a Standard for Lead and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Lead Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Fourth Annual Report, April 1, 1981 to March 31, 1982.*
   Advisory Memorandum 81-III: A Review by the Advisory Council of the Process used to Develop a Standard for Mercury and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Mercury Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Fourth Annual Report, April 1, 1981 to March 31, 1982.*
   Advisory Memorandum 82-II: A Review by the Advisory Council of the Process used to Develop a Standard for Coke Oven Emissions and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Exposure to Coke Oven Emissions in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Fifth Annual Report, April 1, 1982 to March 31, 1983.*
   Advisory Memorandum 82-IV: A Review by the Advisory Council of the Process used to Develop a Standard for Noise and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Noise Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Fifth Annual Report, Vol. I, April 1, 1982 to March 31, 1983.*
   Advisory Memorandum 83-I: A Review by the Advisory Council of the Process used to Develop a Standard for Isocyanates and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Isocyanates Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Sixth Annual Report, April 1, 1983 to March 31, 1984.*
   Advisory Memorandum 84-I: A Review by the Advisory Council of the Process used to Develop a Standard for Benzene and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Benzene Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Seventh Annual Report, April 1, 1984 to March 31, 1985.*
3. Mr. Wrye, then Minister of Labour, addressed this issue in his letter of response to Advisory Memorandum 85-V. The letter is included in *Advisory Council on Occupational Health and Occupational Safety, Ninth Annual Report, April 1, 1986 to March 31, 1987.*
4. Advisory Memorandum 85-V: A Review by the Advisory Council of the Process used to Develop a Standard for Arsenic and Council's Evaluation of the Criteria Utilized to Assess the Hazard of Arsenic Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Eighth Annual Report, Vol. I, April 1, 1985 to March 31, 1986.*
   Advisory Memorandum 86-I: A Review by the Advisory Council of the Process used to Develop a Standard for Ethylene Oxide and Council's

Evaluation of the Criteria Utilized to Assess the Hazard of Ethylene Oxide Exposure in the Workplace, *Advisory Council on Occupational Health and Occupational Safety, Ninth Annual Report, April 1, 1986 to March 31, 1987.*

5. Advisory Memorandum 85-II: Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs, *Advisory Council on Occupational Health and Occupational Safety, Eighth Annual Report, Vol. I, April 1, 1985 to March 31, 1986.*

APPENDIX I

OHB
DR. P.L. PELMEAR
APRIL 21, 1986
965-3211

ISSUE

- ACOHOS question--What is the rationale for including mandatory medical surveillance in the Arsenic Regulation?

RESPONSE

- WHEN THE ARSENIC REGULATION AND ITS CODES WERE DEVELOPED IN 1983, THE STANDARD FORMAT WITH MANDATORY MEDICAL SURVEILLANCE WAS PROPOSED. FOLLOWING THE PUBLIC MEETING ON OCTOBER 20, 1983, COMMENTS WERE RECEIVED, BUT THE CONCERNS WERE RESTRICTED TO THE FREQUENCY OF EXAMINATION AND THE SELECTION OF PHYSICIAN. ONLY THE OFL ADDRESSED THE MANDATORY NEED FOR EXAMINATION AND CLINICAL TESTS.

- ON OCTOBER 17TH, 1985, THE MINISTRY RECEIVED THE ADVISORY COUNCIL'S MEMORANDUM 85-II ON THE CLASSIFICATION OF HEALTH SURVEILLANCE, HEALTH SCREENING AND BIOLOGICAL MONITORING PROCEDURES IN WORKPLACE BIOMEDICAL SURVEILLANCE PROGRAMS. THIS REPORT QUITE RIGHTLY EMPHASIZED THAT MEDICAL SURVEILLANCE SHOULD BE COMPLEMENTARY TO GOOD INDUSTRIAL HYGIENE PROCEDURES AND THAT THE PREVENTIVE OR THERAPEUTIC ACTION MUST NOT SIMPLY ADVANCE THE POINT IN TIME AT WHICH THE DIAGNOSIS OF DISEASE OCCURS BUT ALSO IMPROVE SURVIVAL, FUNCTION OR BOTH. THE PRIMARY OBJECTIVE SHOULD BE TO PROMOTE THE HEALTH OF WORKERS AND TO PREVENT THE OCCURRENCE OF OCCUPATIONAL DISEASES AND INJURIES.

- THE MANDATORY CODE FOR ARSENIC AS WRITTEN (EXAMINATIONS AT LEAST ONCE EVERY THREE YEARS), ALTHOUGH MEETING THE REQUIREMENTS FOR THE FIRST TWO POINTS, DOES NOT COVER THE THIRD. THE PRE-SYMPTOMATIC EXAMINATION OF ARSENIC-EXPOSED WORKERS WILL ONLY DETECT A FEW IF ANY OF THE ACUTE AND CHRONIC EFFECTS.

- THE MINISTRY HAS THEREFORE CONCLUDED THAT, IN THE LIGHT OF THE ADVISORY COUNCIL REPORT 85-II AND THE NEW FORMAT FOR MEDICAL SURVEILLANCE OF CONSTRUCTION WORKERS, THE CODE FOR MEDICAL SURVEILLANCE FOR ARSENIC WORKERS SHOULD ONLY APPLY IF (A) A WORKER HAS INHALED OR INGESTED ARSENIC AND IS LIKELY TO BE AFFECTED THEREBY OR (B) A WORKER HAS REASON TO BELIEVE THAT HIS HEALTH HAS BEEN AFFECTED BY EXPOSURE.

- IN THIS SET OF CIRCUMSTANCES THE WORKER SHALL, AT THE EXPENSE OF THE EMPLOYER, UNDERGO MEDICAL EXAMINATIONS AND TESTS AS INDICATED IN THE CODE.

- THE REQUIRED AMENDMENTS TO THE REGULATION AFFECTING SECTIONS 7 AND 13 ARE BEING DRAFTED AND WILL BE MADE AVAILABLE TO COUNCIL BEFORE THE REGULATION IS FILED.

- WE ARE GRATEFUL TO COUNCIL FOR RAISING THIS ISSUE AND REMINDING US THAT THE REGULATION SHOULD BE MORE APPROPRIATE AND RELEVANT IN THIS RESPECT, AND WE TRUST THAT THIS PROPOSED MODIFICATION NOW MEETS WITH YOUR APPROVAL.

APPENDIX II

TASK FORCE ON MEDICAL EXAMINATIONS

Terms of Reference:

1) To review the requirements, application and interpretation of the Act and regulations with respect to medical examinations and clinical tests including:
   - the justification for requiring the examination or test;
   - the communication of the results thereof (which information and to whom);
   - the provisions for disputing the requirements;
   - the role of 'co-ordinating physician';
   - the role of the Chief Physician;
   - the determination of fitness to work;
   - the implications of current legislation governing health professionals and policies, guidelines and practices of the Ontario College of Physicians and Surgeons and the Ontario College of Nurses.
2) To report and make recommendations to council by March 1988.

Membership:

Council

J.C.L. West – chairman
A.G. Cecutti
A. Dong
W.K.C. Morgan
D. Ublansky

Others

B. Harris – Falconbridge Ltd., Falconbridge
D. Johnson – (retired – Algoma Steel), Sault Ste. Marie
J. Turk – Ontario Federation of Labour, Don Mills

Ontario Ministry of Labour
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400 University Avenue
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February 10, 1988

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational
  Health and Occupational Safety
400 University Avenue, 15th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of December 29, 1987, forwarding a copy of Advisory Memorandum 87-V "Concerning Mandatory Post-exposure Medical Examinations". As you know, my officials are carrying out an extensive review of the mandatory medical surveillance programs and provisions for post-exposure medical examinations which are currently in place in some of the designated substance regulations. Council's thorough analysis and advice will become an important element of this review.

My officials have reviewed the Memorandum and are in agreement with many aspects of Council's analysis. For example, the Ministry agrees with Council that post-exposure medical examinations are distinct from both examinations and tests required under medical surveillance programs and from pre-placement and periodic examinations of workers in cases where the health of a worker may affect the health and safety of others. These distinctions were discussed by my officials at a meeting held on September 27, 1987 with Council's task force on medical examinations.

In your letter accompanying Advisory Memorandum 87-V you noted that Council had expressed concerns about the purpose and process of the Ministry's use of Council's criteria for medical surveillance, as set out in Advisory Memorandum 85-II. The criteria and the advice in the memorandum gave my officials valuable guidance in their development of the rationale for the inclusion or retention of mandatory medical surveillance programs for a number of designated substances.

Council's specific concerns were not stated in your letter. However, my officials would be pleased to meet with members of the task force to discuss any concerns they may have.

In closing, I wish to inform you that while I am prepared to accept in principle ACOHOS Recommendation 87-8 that the Minister of Labour ensure that regulations under the Occupational Health and Safety Act not include provisions requiring workers to undergo post-exposure medical examinations, I intend to request that the recently established Joint Steering Committee on Hazardous Substances in the Workplace review this issue in the near future.

Once again I would like to thank Council for their thoughtful analysis and advice.

Yours truly,

Gregory Sorbara
Minister

Advisory Memorandum 87-VI

Ontario
Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

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March 18, 1988

The Honourable Gregory Sorbara
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Sorbara:

On behalf of the Advisory Council I am pleased to submit Advisory Memorandum 87-VI Concerning Mandatory Health Surveillance.

Yours truly,

D.R. McCalla

D.R. McCalla
Chairman

Encl.

cc: G. Thompson
T. Millard

Advisory Memorandum 87-VI to the Minister of Labour March 18, 1988

Concerning Mandatory Health Surveillance

INTRODUCTION

This document deals with the rationale and justification for mandatory health surveillance and related issues. Health surveillance is defined as:

> the continuing or periodic examination of groups of workers for the purpose of diagnosing impairment or disease. Such surveillance may include serial physical examinations, biological testing of body fluids, and selected appropriate laboratory tests.

Advisory Memorandum 85-II[1] identified a number of criteria for evaluating the validity and value of various biomedical surveillance procedures and also suggested questions that should be answered prior to determining whether or not the procedures should be mandated. As it was noted that the classification of the procedures depended on consideration of all the factors in a specific circumstance, council recommended that a committee of independent experts advise the minister on whether or not worker participation should be mandated or whether procedures should be mandated – offered or not offered.

The purpose of this document is to clarify council's position on the circumstances that justify *mandating* health surveillance. Justification for mandating worker participation and for mandating employers to provide a health surveillance program for which worker participation is voluntary are considered separately.

In Advisory Memorandum 87-V council recommended to the Minister of Labour that regulations under the *Occupational Health and Safety Act* not include provisions *requiring* workers to undergo post-exposure medical examinations.[2] It was clearly stated in that document '... that post-exposure medical examinations are distinct from the examinations and tests that are required by medical surveillance programs and also distinct from preplacement and periodic examinations of workers in cases where the health of a worker may affect the health and safety of others'.

Preplacement and periodic medical examinations for the purpose of protecting the health and safety of others and medical examinations in surveillance programs are considered in this document and are included in the definition of health surveillance. However, the issues of routine preplacement medicals and medicals for determining fitness to work are not functions of health surveillance and are not dealt with in this document.

BACKGROUND

During the process of reviewing the rationale and justification for post-exposure medical examinations, a task force of council met with ministry personnel. The ministry personnel explained that certain criteria, said to be based on council's advice, were being used to determine whether medical surveillance programs should be included in designated substance regulations. If the criteria were not satisfied, provisions for post-exposure medical examinations and tests were included in the regulations. As the task force was dealing, at that time, only with the rationale and justification for post-exposure medical examinations, it did not address the issues of the criteria or their use. However, these issues were brought to council's attention and, in the letter accompanying Advisory Memorandum 87-V, Dr. McCalla, chairman of council, noted that council 'asked its task force on medical examinations to consider the criteria and the process currently being used by the ministry to determine whether or not medical surveillance should be mandatory.'[3]

ANALYSIS

The task force commenced its analysis by asking some basic questions:

1) Should health surveillance ever be mandatory?

   If so, under what circumstances?, and

   How are these circumstances determined?

2) Are there other issues relating to health surveillance that need to be dealt with in the *Occupational Health and Safety Act* and regulations?, such as:
   - whether employers should ever be *required to provide* health surveillance programs if worker participation is not mandatory;
   - whether employers should be required to pay for such programs;
   - whether there is a need to include provisions in the legislation for a co-ordinating physician;
   - whether there should be provisions in the Act to protect the confidentiality of the health records of workers participating in health surveillance programs.

3) Should health surveillance be used to assess fitness to work?

Circumstances That Justify Mandating Health Surveillance

a) Worker Participation

Council considered the issue of whether worker participation in health surveillance should ever be mandatory and concluded that it should be mandated only in situations where the surveillance would identify a medical condition that would prevent a worker from performing his or her job safely *and* where this would cause a significant risk to the health and safety of others, *and* where there are valid and effective tests to make such a determination.

As stated earlier, two different types of health surveillance that are currently required by legislation were considered.

1) The pre-employment, pre-placement and periodic examinations of specific subgroups of workers performed for the purpose of protecting the health and safety of others. Council recognizes that such health surveillance is required by law for a number of occupations.[4]

2) Periodic examinations like those required in the designated substance regulations made under the *Occupational Health and Safety Act*. The purpose of such examinations, stated in the regulations,

   'is to protect the health of workers by:

   - ensuring fitness for exposure to ... (a particular substance),
   - evaluating the effects of ... (the substance) exposure on the worker,
   - enabling remedial action to be taken when necessary, and
   - providing health education.'[5]

Council considered the advantages and benefits of health surveillance programs (see also Advisory Memorandum 85-II) and attempted to identify circumstances that would justify ***mandating*** worker participation in a program that is designed to protect a worker's health and it concluded that the only justification for requiring a worker to participate in a health surveillance program is where non-participation would endanger the health or safety of others.

ACOHOS RECOMMENDATION 87-9

> that worker participation in health surveillance be mandated only in circumstances where it would identify a medical condition that would prevent a worker from performing his or her job safely, thereby causing a significant risk to the health or safety of the public or other workers ***and*** where there are valid and effective procedures to make such a determination.

b) Should Employers Be Required to Offer Health Surveillance Programs?

Council considers that well-designed health surveillance programs based on scientifically validated procedures to protect the health and safety of workers should be offered to workers and workers encouraged to participate voluntarily. However, this raises the issue of whether employers should be ***required*** to offer such programs.

Council concluded that, if a health surveillance program could be considered to be a 'precaution reasonable in the circumstances for the protection of a worker'[6], the employer should have the duty to offer and pay for it.

ACOHOS RECOMMENDATION 87-10

> that the Minister of Labour ensure that an employer is required to offer and pay for health surveillance programs that can be demonstrated to be a 'precaution reasonable in the circumstances for the protection of a worker'[6] and where there are valid and effective tests.

It is recognized that there are likely to be disparate views about the validity and effectiveness of a health surveillance program and about whether it could be considered a 'reasonable precaution'. Council accordingly suggests that there should be a mechanism, involving the affected parties, for appointing an expert committee to advise the minister as to whether the procedures/programs are valid, effective, would be a 'reasonable precaution', and, therefore, whether programs should be mandated – offered or not offered.

ACOHOS RECOMMENDATION 87-11

> that the Minister of Labour develop a mechanism involving labour and management to appoint a committee of independent medical and scientific experts to advise the minister as to whether particular biomedical surveillance procedures are valid and effective and whether they are reasonable precautions for protecting workers' health.

Council believes that health surveillance programs, like other programs designed to promote the health of workers and to prevent the occurrence of occupational diseases and injuries, should be developed jointly by labour and management and designed for conditions at a specific workplace. It is recognized that many such programs are provided by companies and/or are negotiated by collective bargaining and included in labour-management contracts.

However, as stated in Advisory Memorandum 85-II[1], if the biomedical surveillance procedures cannot be shown to be scientifically valid and effective, they should not be offered.

Therefore, council recommends:

ACOHOS RECOMMENDATION 87-12

> that the Minister of Labour develop a strategy for educating workers, managers and occupational health personnel about the need to consider the purpose, function and validity of all biomedical surveillance procedures that are included in health surveillance programs and stress that if no valid procedures exist that can achieve the objectives of the program, the program should not be offered.

The Federal Task Force on Health Surveillance of Workers[7] co-ordinated the review and evaluation of many of the commonly used procedures and made recommendations concerning the conditions and use (or not) of the various procedures. Council notes the value of such reviews but, due to the rapid advances in science and medicine, recommends that decisions about the value of specific procedures be based on the most up-to-date information available at the time.

It was for this reason that council, in 1985, recommended the use of an independent expert committee to classify specific procedures according to the criteria set out in Advisory Memorandum 85-II.[1]

Co-ordinating Physicians

Section 17(1)(*e*) of the *Occupational Health and Safety Act* requires workers to undergo, at the expense of the employer, such examinations and tests as prescribed. A number of the designated substance regulations contained provisions requiring medical surveillance of workers as part of the control program. It was anticipated that allowing workers the right to consult his or her own physician would make it difficult to detect weak trends from, perhaps, slight effects noted in groups of workers from the same workplace. It was considered that the appointment of a co-ordinating physician would reduce the administrative problems and increase the benefits from health surveillance programs. There was reference to a co-ordinating examining physician in the designated substance regulation respecting isocyanates and there was a proposal to amend the Act (Bill 106) to expand the powers of the Lieutenant Governor in Council to make regulations requiring the appointment of a physician to act as co-ordinating physician with respect to any medical surveillance program of an employer.

Council agrees that it is very important that health surveillance programs are co-ordinated and that there is quality control for the procedures and the collection and interpretation of data. However, the issue of whether or not there is a need to include provisions in the occupational health and safety legislation for a co-ordinating physician depends on whether or not there is a need for *mandating* these functions in the Act.

Council agrees that group data can be very helpful in detecting:

1) hitherto unrecognized effects of exposure to a particular agent, and

2) breakdown or breakthrough of control systems in the workplace.

However, as council did not consider that either of these benefits was sufficient justification to mandate health surveillance programs in legislation, it did not consider that they could justify *mandating* a co-ordinating physician in the occupational health and safety legislation.

Co-ordinated group data is also essential for epidemiological studies that are performed to further the understanding and knowledge of the health effects of various agents used in the workplace. To be of value, such studies have to be strictly controlled and planned, i.e. the parties should have agreed to all the procedures, both technical and administrative (such as those for ensuring quality control and consistency), before the studies begin; the study should have been explained to all workers; and the workers must have agreed, voluntarily, to participate.

In cases where health surveillance programs are offered to workers and/or are agreed to (e.g. as a result of collective bargaining), the details of the programs, including the administration of records and data, should be determined and agreed to by the affected parties.

Finally, in the case of mandatory health surveillance where the purpose is to determine whether a particular worker can perform his or her job safely, the criteria and reporting systems are clearly stated, and administration of group data is not an issue. Hence, council concluded that there is no need to include a provision in the occupational health and safety legislation for a co-ordinating physician.

Confidentiality of Health Records

The issue of confidentiality of health records was addressed in the designated substance regulations containing provisions for health surveillance programs. However, if these provisions are removed, the provisions for protecting the confidentiality of records would, presumably, also be removed.

Confidentiality of medical records is covered under the *Health Disciplines Act*; however, the ownership, storage, access and disclosure of occupational health records are not as clear-cut as they are for other medical records where there are only two major parties involved: the physician (and/or nurses) and the patient. Difficulties can arise with the confidentiality of occupational health records when a third party is paying for the examinations and is required to receive some information and/or the examinations are required by law for specific purposes. In the case of occupational health, it is important that the employer be provided with information on workplace-induced illnesses or injuries so that preventive and/or remedial measures can be taken. However, it is very important that information that could be linked to individual worker's health records be released to the employer only with the worker's written consent. The control of the release of information to an employer for the purpose of processing Workers' Compensation Board claims is dealt with in the *Workers' Compensation Act*.

For these reasons, council considers that it may be necessary to provide for the confidentiality of health records in the occupational health and safety legislation.

Principles underlying disclosure were dealt with in the Krever Commission Report[8]; however, as yet, they do not appear to have been incorporated into any legislation. Council understands that during discussions of the draft Bill to Amend the Act, this issue was addressed by the Ontario Medical Association (OMA), and a revised provision was included in Bill 106, tabled in 1987. Council endorses the principles that were included in section 9 [to amend section 19(d) (1) to (3)] of Bill 106 and recommends:

ACOHOS RECOMMENDATION 87-13

> that the Minister of Labour provide for the protection of the confidentiality of a worker's health records in the occupational health and safety legislation.

Fitness to Work

Council considered the issue of whether or not health surveillance should be used to assess fitness to work (i.e. the determination of whether the worker is capable of performing the assigned task). It concluded that such a determination would not be included in the definition of health surveillance and that it should be dealt with in the workplace as a separate and distinct issue.

References and Footnotes

1. Advisory Memorandum 85-II: Classification of Health Surveillance, Health Screening and Biological Monitoring Procedures in Workplace Biomedical Surveillance Programs. *Advisory Council on Occupational Health and Occupational Safety Eighth Annual Report, Vol. I, April 1, 1985 to March 31, 1986.*
2. Advisory Memorandum 87-V: Concerning Mandatory Post-exposure Medical Examinations to be published in *Advisory Council on Occupational Health and Occupational Safety Tenth Annual Report, April 1, 1987 to March 31, 1988.*
3. Letter from the chairman of council submitting Advisory Memorandum 87-V: Concerning Mandatory Post-exposure Medical Examinations to the Minister, dated December 29, 1987.
4. Such as: crane operators and hoist operators in the Regulation for Mines and Mining Plants R.R.O. 1980, Reg. 694 under the *Occupational Health and Safety Act*, airline pilots in the *Aeronautics Act*, and hospital employees in the *Public Hospitals Act*.
5. Designated Substance Regulations made under the *Occupational Health and Safety Act* (see specifically Regulation respecting Asbestos, Ontario Regulation 570/82).
6. Section 14(2)(*g*) of the Act states that an employer shall, 'take every precaution reasonable in the circumstances for the protection of a worker.'
7. Health Surveillance of Workers: The Report of the Task Force on Health Surveillance of Workers, Department of National Health and Welfare, Health Services and Promotion Branch, published in the *Canadian Journal of Public Health, Vol. 77, pp. 91-108, 1986.*
8. *Krever Report:* Report of the Commission of Inquiry into the Confidentiality of Health Information, 1980.

Follow-up Correspondence to Previous Advisory Memorandum 86-I

Advisory Council on Occupational Health & Occupational Safety
Conseil consultatif de la santé et de la sécurité au travail
Ontario

Office of the Chairman
Bureau du président

400 University Avenue
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416/965-2448

April 29, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

Council has, in the past, reviewed the process of developing Designated Substance Regulations and has made a number of comments and recommendations regarding the openness and consultative approach of the developmental process. When the proposed ethylene oxide regulation was submitted to council for review, a copy was also circulated to interested parties. Accompanying the proposed regulation was a notice (dated March 21, 1986) which explained the changes that had been made since the draft regulation was presented at the public meeting and which indicated that, at the time the regulation went to Cabinet, the interested parties would be informed of any further changes. A notice dated April 10, 1987 accompanying the final regulation, however, did not mention any changes.

While it is recognized that many of the changes are minor, council considers that some of the changes have significant implications.

Yours truly,

D. R. McCalla
Chairman

cc: G. Thompson
: Assistant Deputy Minister's Office
: A. Gladstone
: A. Robinson

Ontario
Ministry of
Labour

Ministère
du Travail
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June 5, 1987

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health and
Occupational Safety
400 University Avenue, 11th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla,

Thank you for your April 29, 1987 letter bringing to my attention that the April 10, 1987 Notice accompanying the final ethylene oxide regulation did not mention minor changes which had been made since the public meeting held on June 12, 1985.

I understand that this omission was an oversight on the part of my officials. Therefore, I have sent a notice to interested parties on the ethylene oxide mailing list which outlines the changes made to the ethylene oxide regulation since the public meeting. A copy of the notice is enclosed for your information.

Thank you for informing me of this oversight.

Sincerely,

WILLIAM WRYE
Minister

Ontario Ministry of Labour
Ministère du Travail de l'Ontario

Office of the Minister
Bureau du Ministre

400 University Avenue
Toronto, Ontario
M7A 1T7
416/965-4101

June 5, 1987

NOTICE

The Regulation respecting Ethylene Oxide was filed on March 24, 1987 as O. Reg. 146/87. Sections 1 to 3, 6, 8 and 10 came into effect on the filing date; sections 4, 5, 7 to 9 and 11 to 17 will come into effect on June 22, 1987.

This notice is to inform you that the final ethylene oxide regulation contains provisions made as a result of comments received subsequent to the public meeting of September 26, 1985, advice from the Advisory Council on Occupational Health and Occupational Safety, and to be consistent with a number of provisions introduced in other regulations. I wish to draw your attention to the following changes:

- Following advice from my Advisory Council on criteria for mandatory medical surveillance, the provision for mandatory medical surveillance and the Code for Medical Surveillance of Ethylene Oxide Exposed Workers have been removed from the regulation. Instead, provision is made for medical examinations where, as a result of exposure to ethylene oxide, a worker, a worker's physician or an employer believes that a worker's health has been affected by exposure to ethylene oxide or where the Chief Physician of the Occupational Health Medical Service so requires. The regulation also provides for a dispute resolution mechanism.
- A definition of "Director" as the Director of the Occupational Health Branch of the Ministry has been included in section 1.
- Where a respirator is provided by an employer at the request of a worker, regardless of the level of exposure, the worker is required to use the respirator.
- The requirement in the emergency program to include provisions for an alarm system to warn of an emergency has been revised to include provisions for an effective evacuation system.
- In the Schedule the time-weighted average exposure of a worker to airborne ethylene oxide now must be calculated for an eight hour day in addition to the required calculation for a forty hour week.

A number of minor changes have been made in the language of the regulation to maintain consistency with other regulations.

WILLIAM WRYE
Minister

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Follow-up Correspondence to Previous Advisory Memorandum 86-III

Ontario Ministry of Labour **Ministère du Travail de l'Ontario**

Office of the Minister
Bureau du Ministre

400 University Avenue
Toronto, Ontario
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November 3, 1987

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue, 11th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I am writing with respect to your letter of March 25, 1987, which submitted Advisory Memorandum 86-III, Concerning Consultation, to my predecessor. Since taking on my new portfolio, it has come to my attention that Advisory Memorandum 86-III requires a response.

The Memorandum raises some fundamental issues and concerns with respect to the state of occupational health and safety in Ontario. Please be assured that these concerns are recognized, and are being acted upon.

In September, 1987, a working group comprised of Ministry of Labour officials, and representatives from labour and management met to discuss the concept of a bipartite committee to develop and review regulations for hazardous materials in Ontario workplaces.

As a result of the deliberations of this working group, it was agreed that a bipartite Steering Committee would be established. The Steering Committee will consist of equal numbers of representatives from industry and labour, and is to be chaired by the Assistant Deputy Minister of the Occupational Health and Safety Division.

The primary objective of the Steering Committee is to advise the Minister of Labour on all matters relating to the development and review of regulations for hazardous substances (including biological and physical agents) in Ontario workplaces. In addition, the Steering Committee will advise the Minister on,

o priorities for the development of hazardous substances regulations;

- o policies, principles and procedures for standard setting;
- o priorities for research and data gathering, respecting the regulation of hazardous substances; and
- o new approaches to the regulation of hazardous substances in Ontario.

It is my sincere belief that this initiative represents a new and open approach by the Ministry of Labour that goes a long way towards addressing the issues that Council raised in its memorandum.

I look forward to a constructive and positive relationship with Council.

Yours truly,

GREGORY SORBARA
Minister

Follow-up Correspondence to Previous Advisory Memorandum 86-IV

Ontario Ministry of Labour **Ministère du Travail de l'Ontario**

Office of the Minister
Bureau du Ministre

400 University Avenue
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November 23, 1987

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational Health and
Occupational Safety
11th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of March 31, 1987, forwarding a copy of Advisory Memorandum 86-IV, containing Council's review of the development process for the Regulation respecting Lead on Construction Projects. With this careful and thoughtful review, Council has once again made a valuable contribution to the development of a designated substance regulation.

My officials advise me that the most important issue raised by Council is related to the application of the proposed regulation. Council questioned the distinction, created by subsection 2(2), between employers who have a lead control program on the filing date of the proposed regulation and those who do not. Specifically, two questions were asked: If the proposed regulation is more protective, why should some workers be offered less protection? Or if the regulations are equivalent, why should some employers have to administer two regulations?

Inclusion of the "grandfather" provision in subsection 2(2) was requested by representatives of large non-construction companies, which prefer the flexibility of working under their lead control programs to following the prescribed procedures of the proposed regulation. It is also administratively simpler, as Council has pointed out, for these companies to be covered by a single regulation. But these companies do not necessarily represent the views of all employers with a lead control program. Experience with the asbestos regulation for construction projects (O. Reg. 654/85) has shown that many companies prefer the procedural approach of the construction regulation. For these companies the grandfather clause does not represent flexibility; it locks them into monitoring, record keeping and medical programs that are inappropriate for the type of work they are carrying out. There is, in fact, more flexibility with the construction regulation because under the variance section the use of procedures developed under a lead control program may be allowed.

In response to the questions raised by Council, my officials advise me that the Regulation respecting Lead and the proposed lead regulation for construction projects offer equivalent protection. The different approach to regulatory control of lead exposure, as represented by the two lead regulations, is based on the fact that it is the type of work which dictates the most appropriate control strategy. Council's suggestion to delete the date in the "grandfather" clause was not implemented because it would, in effect, allow certain employers to opt out of the proposed regulation by developing a lead control program.

I have therefore decided to delete subsection 2(2). This will restore the original rationale for the proposed regulation: that it is a regulation for construction work. This is consistent with the amendments I have recently proposed for the Regulation respecting Asbestos, O. Reg. 570/82. While it may be true that certain large companies have the expertise to develop their own procedures for working with lead in construction, this is unlikely to be the case for most companies. It is preferable for these companies to follow the prescribed procedures of the proposed regulation. If the larger companies wish to develop and apply their own procedures, they can do so under the variance section of the proposed regulation.

The second application-related issue raised by Council had to do with contract workers as referred to in subsection 3(2) of the Regulation respecting Lead, O. Reg. 536/81. Council is concerned that such workers may receive less protection because they would not participate in a medical surveillance program, or worse, they may not be covered by either the existing or proposed lead regulations. My officials have reviewed the application sections of both lead regulations, as Council recommended, and have advised me that Council's concerns point to a very real possibility. Accordingly, I have decided that the Regulation respecting Lead should be amended to make its application section the same as that of other designated substance regulations with respect to contract workers.

Other issues raised by Council have been addressed by my officials and are included in the attachment to this letter. I would like once again to thank the members of Council for their efforts and note that Council's review has led to an improved regulation for lead on construction projects.

Yours truly,

Gregory Sorbara
Minister

Attachment

REGULATION RESPECTING LEAD ON CONSTRUCTION PROJECTS

Summary and Response to Other Issues Raised by the Advisory Council

Occupational Health and Safety Division
November 13, 1987

REGULATION RESPECTING LEAD ON CONSTRUCTION PROJECTS

Summary and Response to Other Issues Raised by the Advisory Council

Classification of Operations Not Listed in the Proposed Regulation

Council is concerned that not all operations that could result in worker exposure to lead have been included in the proposed regulation. Council has therefore recommended the addition of a provision for protecting workers involved in such operations.

A similar issue arose during the development of the asbestos construction regulation, and accordingly that regulation contains a "catch all" clause that requires operations involving asbestos exposure that are not specifically mentioned in the regulation to be classified as Type 2. The same approach should be employed with the proposed regulation. However, because of uncertainty about the risks associated with the unclassified operations, they should be classified as Type 3 to cover the worst cases of exposure. This could result in overly stringent controls in some cases, but the variance section (section 14) of the regulation provides a way out. Under this section, if an employer shows that the unclassified operation would result in a low level of exposure and that Type 1 or Type 2 controls provided adequate protection, Type 3 controls would not be necessary.

Definition of Lead

Council has pointed out that despite having a definition of lead that includes organic lead compounds, the proposed regulation lists no operations that involve exposure to organic lead and has no procedures designed to protect workers from organic lead compounds and no provision has been made for clinical tests for determining exposure to organic lead. Council has recommended that the potential for construction workers being exposed to organic lead be reviewed and that the proposed regulation be clarified as to its application to organic lead compounds.

Apart from demolition or repair of organic lead production facilities, there is little likelihood of workers having significant exposure to organic lead on a construction project. Currently, there is only one plant that produces organic lead in Ontario, chiefly gasoline additives. This plant is large and has a control program in place which should make provision for demolition and repair operations. Therefore there is no need for a separate set of procedures for organic lead in the proposed regulation. The reference to organic lead in the lead definition has been deleted.

Medical Examinations and the Fitness Determination

Subsection 13(1) of the proposed regulation requires the examining physician to advise the employer and the Chief Physician of a worker's fitness for work in lead exposure. Council has questioned why this provision only applies "where a worker is continuing to work in lead exposure". Council has noted that, because of the variable nature of construction work, it would be difficult for the examining physician to know whether a worker would be continuing to work in lead exposure and that even where a worker will not continue to work in lead exposure, it is important that an employer be alerted to any situation that leads to overexposure.

Council's point is well taken and the phrase "where a worker is continuing to work in lead exposure" has been deleted from the proposed regulation.

Action Levels for Blood Lead

At its January 1987 meeting with Division officials, Council's Regulation Task Force asked about the status of a Ministry review on blood lead action levels and whether decisions had been made on: (a) action levels; (b) the discrepancy between the action levels; (c) the discrepancy between the action levels for males and females; and (d) whether there would/could be any justification for different action levels in different sectors. This review has recently been completed and, in accordance with Council's wishes, has been sent out for an external peer review. Following this review it will be made available for public comment.

I agree with Council that action levels are extremely important for the protection of workers. However, the promulgation of the proposed regulation should not be delayed by pending decisions on the blood lead issue. If changes in the action levels are found to be necessary both lead regulations can be amended at the same time.

Other Issues

Council had several additional concerns. Among them are the following:

- appropriate washing facilities should be required under subsection 6(3);
- signs should be posted to alert workers that there is the potential for a hazard so that workers can seek further information if necessary; and
- the use of compressed air and dry sweeping for the clean-up of dust or waste that could contain lead should be prohibited (section 8).

Council has also noted that, under subsection 14(2), an employer can determine blood lead levels by a method other than specified in the Code and a Director's approval is not required for such a variance. Council questions why the Code is part of the regulation if it need not be followed. Council has also questioned why section 11 (medical examinations) is not consistent with the corresponding sections in O. Reg. 654/86.

Council has pinpointed some important deficiencies in the proposed regulation. Accordingly, the following changes have been made:

- subsection 6(3) has been reworded as follows: "Washing facilities with clean water, soap and individual towels shall be provided to workers at the project and shall be used by a worker upon completion of the work and prior to eating, drinking or smoking and on leaving the project;"
- signs are to be posted for all Type 3 operations using the same wording as in clause 9(1)(c);
- the prohibition of compressed air and dry sweeping in clean-up operations, that was specified only for Type 2 operations, has been extended to all types of operations;
- the code for determination of lead in blood has been replaced with accuracy, precision and specificity criteria that must be met when performing blood lead determinations; and
- section 11 has been made consistent with O. Reg. 654/86.

Other Correspondence

i) Correspondence concerning medical examination provision in Ontario Regulation 654/86

Ontario

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Office of the
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416/965-2448

April 29, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

I am writing on behalf of council to seek clarification on an issue discussed at council's meeting in April.

Council noted that, although Regulation 654/86 (Respecting Control of Exposure to Biological or Chemical Agents) includes a provision for a worker to undergo a medical examination and clinical tests at the employer's expense, the regulation does not contain a section dealing with the handling and disclosure of examination or test results.

Recent designated substance regulations that have a similar provision for medical examinations have included a Section requiring the physician to:

- advise the employer whether the worker is fit, fit with limitations or unfit without disclosing the records or results of the examination or tests, and advise the joint
- health and safety committee in writing on a confidential basis,

and noting that if the worker is removed from exposure the worker is entitled to compensation in the manner and to the extent provided by the Workers' Compensation Act.

Council wondered why a similar provision was not included in Regulation 654/86.

Yours truly,

D. R. McCalla
Chairman

cc: G. Thompson
: Assistant Deputy Minister's Office
: A. Gladstone
: Dr. A. E. Robinson

Ontario Ministry of Labour **Ministère du Travail de l'Ontario**

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June 19, 1987

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

I have received your letter of April 29, 1987 in which you seek clarification, on behalf of Council, of the medical examination provision in Ontario Regulation 654/86 (the Regulation Respecting Control of Exposure to Biological or Chemical Agents). I note Council's concern that the provision that has been included in the designated substance regulations to ensure confidentiality of medical records; that is, to require the physician to advise the employer only as to fitness to work, has not been included in O.Reg. 654/86.

Your letter notes that the designated substance regulations also require such advice as to fitness to work to be provided to the joint health and safety committee in writing on a confidential basis. This is appropriate in a designated substance regulation which requires a joint health and safety committee in every workplace in which the designated substance is present. The question of whether a similar provision is appropriate in O.Reg. 654/86, which does not require the formation of joint health and safety committees, is being considered.

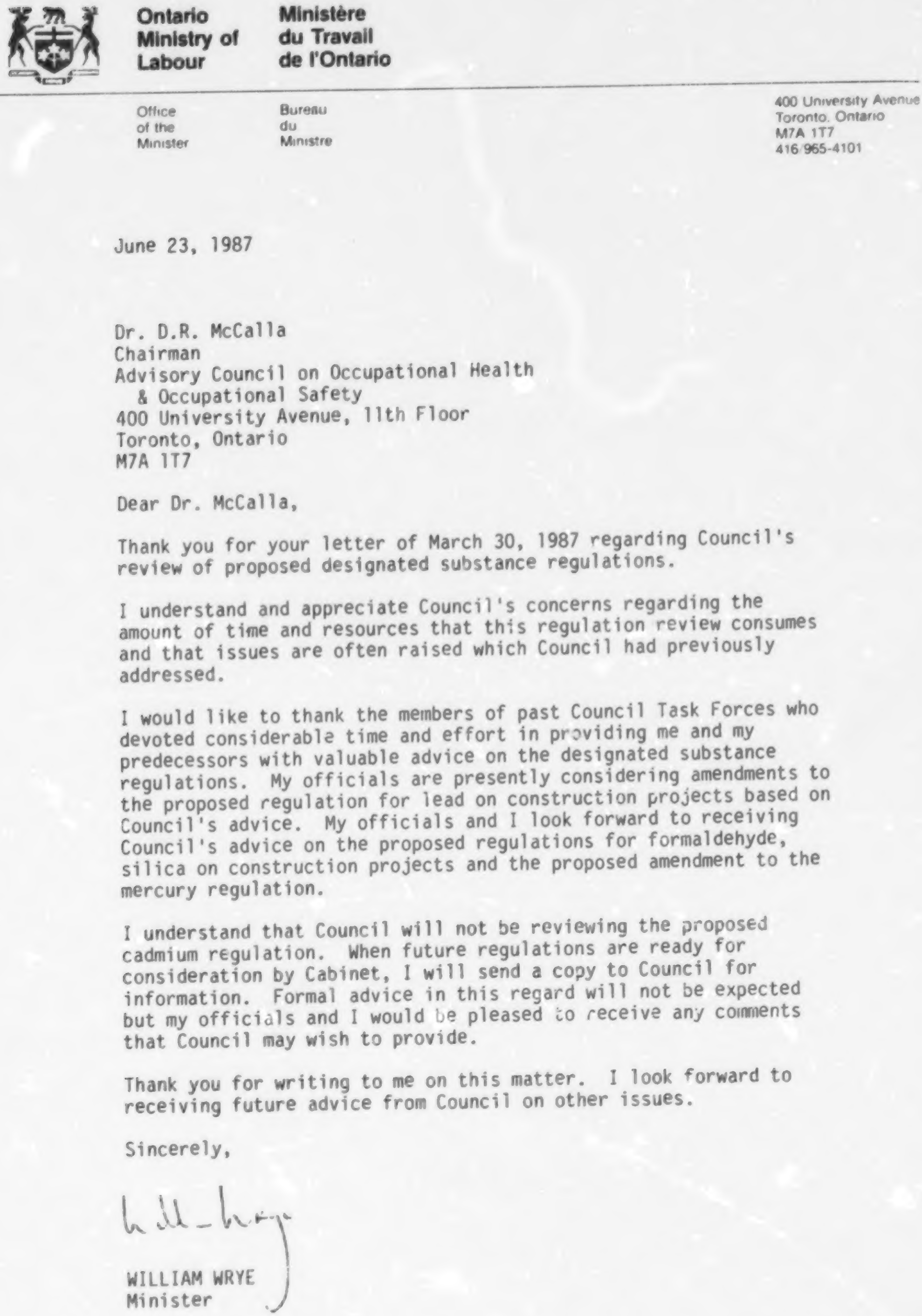
Staff of the Occupational Health and Safety Division have been collecting in-house and public comments on issues dealing with O.Reg. 654/86, with a view to making such amendments as may be necessary to ensure the health and safety of workers exposed to toxic substances in the workplace. The concerns raised by Council will be dealt with when a package of amendments to the regulation has been prepared.

I wish to thank Council for bringing these matters to my attention.

Sincerely,

WILLIAM WRYE
Minister

ii) Correspondence concerning council's role in reviewing the process used in the development of proposed designated substance regulations



Ontario Ministry of Labour | **Ministère du Travail de l'Ontario**

Office of the Minister | Bureau du Ministre

400 University Avenue
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June 23, 1987

Dr. D.R. McCalla
Chairman
Advisory Council on Occupational Health
& Occupational Safety
400 University Avenue, 11th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla,

Thank you for your letter of March 30, 1987 regarding Council's review of proposed designated substance regulations.

I understand and appreciate Council's concerns regarding the amount of time and resources that this regulation review consumes and that issues are often raised which Council had previously addressed.

I would like to thank the members of past Council Task Forces who devoted considerable time and effort in providing me and my predecessors with valuable advice on the designated substance regulations. My officials are presently considering amendments to the proposed regulation for lead on construction projects based on Council's advice. My officials and I look forward to receiving Council's advice on the proposed regulations for formaldehyde, silica on construction projects and the proposed amendment to the mercury regulation.

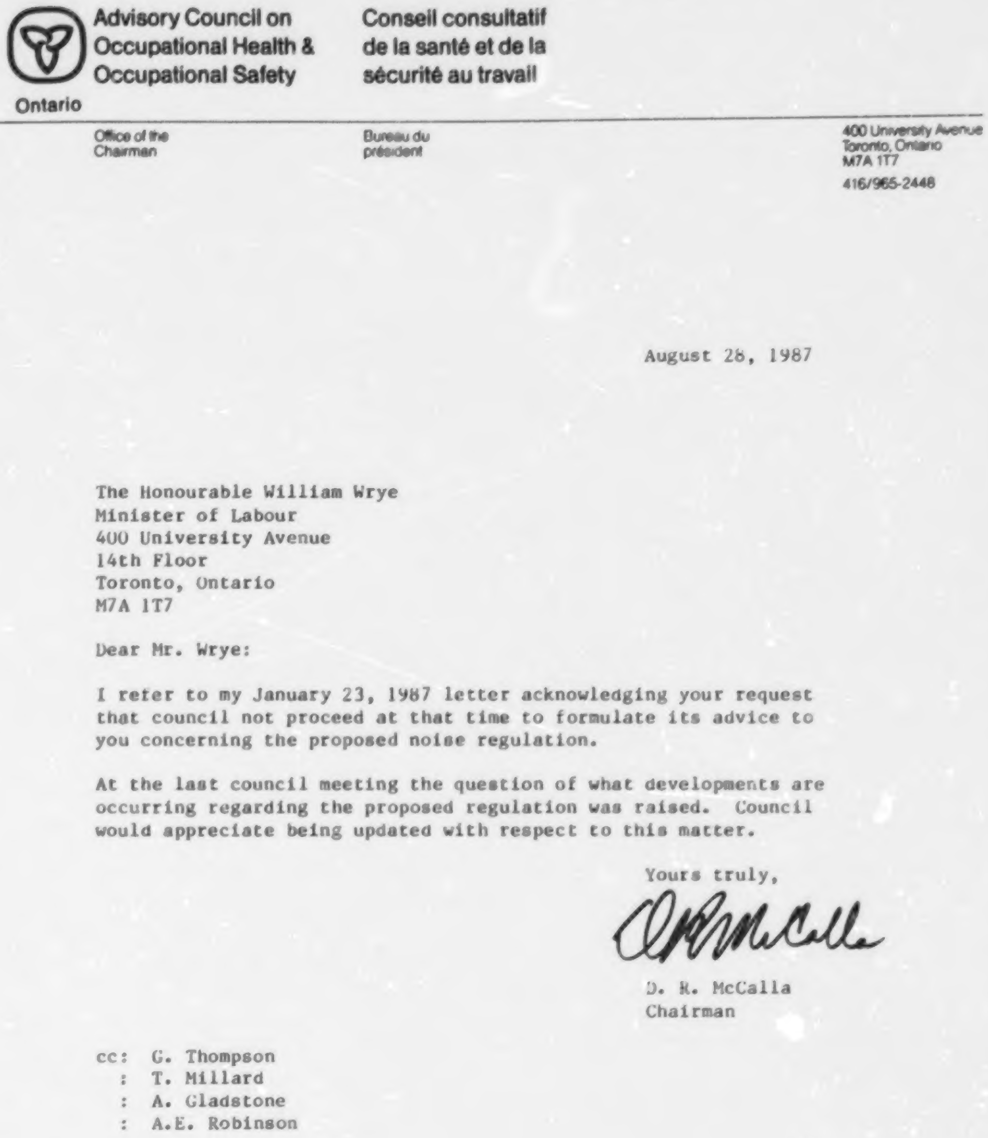
I understand that Council will not be reviewing the proposed cadmium regulation. When future regulations are ready for consideration by Cabinet, I will send a copy to Council for information. Formal advice in this regard will not be expected but my officials and I would be pleased to receive any comments that Council may wish to provide.

Thank you for writing to me on this matter. I look forward to receiving future advice from Council on other issues.

Sincerely,

WILLIAM WRYE
Minister

iii) Correspondence concerning proposed noise regulation



Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

Office of the
Chairman

Bureau du
président

400 University Avenue
Toronto, Ontario
M7A 1T7

416/965-2448

August 28, 1987

The Honourable William Wrye
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Wrye:

I refer to my January 23, 1987 letter acknowledging your request that council not proceed at that time to formulate its advice to you concerning the proposed noise regulation.

At the last council meeting the question of what developments are occurring regarding the proposed regulation was raised. Council would appreciate being updated with respect to this matter.

Yours truly,

DRMcCalla

D. R. McCalla
Chairman

cc: G. Thompson
  : T. Millard
  : A. Gladstone
  : A.E. Robinson

Ontario
Ministry of
Labour

Ministère
du Travail
de l'Ontario

Office
of the
Minister

Bureau
du
Ministre

400 University Avenue
Toronto, Ontario
M7A 1T7
416 965-4101

October 23, 1987

Dr. D. R. McCalla
Chairman
Advisory Council on Occupational
Health and Occupational Safety
11th Floor, 400 University Avenue
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of August 28, 1987 requesting an update on developments regarding the proposed noise regulation.

I understand that due to the recent election, my predecessor was unable to further the implementation of the proposed noise regulation. I now intend to give it my close attention and will advise you of the resulting developments as soon as possible.

Yours truly,

Gregory Sorbara
Minister

Advisory Council on
Occupational Health &
Occupational Safety

Conseil consultatif
de la santé et de la
sécurité au travail

Ontario

Office of the
Chairman

Bureau du
président

400 University Avenue
Toronto, Ontario
M7A 1T7

416/965-2448

November 25, 1987

The Honourable Gregory Sorbara
Minister of Labour
400 University Avenue
14th Floor
Toronto, Ontario
M7A 1T7

Dear Mr. Sorbara:

Council has spent much time considering the regulation and control of noise in the workplace. Due to serious concerns with the proposed designated substance regulation respecting noise that was submitted to council for review in July 1986, council invited the former Minister of Labour, Mr. Wrye, to a meeting to discuss the issues. When Mr. Wrye met with council in January of 1987 he informed council that he was withdrawing the proposed regulation for further consideration and requested that council not proceed at that time to formulate its advice to him.

Council has concern that the proposed regulation may still leave some issues unresolved. As a bipartite committee has been established to deal with the development and review of regulations for hazardous substances in the workplace, council recommends that, prior to proceeding with the regulation of noise, the matter be referred to that committee for its consideration.

If the decision is made not to refer the proposed regulation to the bipartite committee, council would welcome the opportunity to meet with you to discuss its concerns.

For your information I enclose a copy of council's letters of October and November 1986 to Mr. Wrye.

Yours truly,

DRMcCalla

D.R. McCalla
Chairman

Encls.

c.c: G. Thompson
T. Millard

Ontario Ministry of Labour
Ministère du Travail de l'Ontario

Office of the Minister
Bureau du Ministre

400 University Avenue
Toronto, Ontario
M7A 1T7
416 965-4101

January 15, 1988

Dr. D. R. McCalla
Advisory Council on Occupational Health
and Occupational Safety
400 University Avenue
11th Floor
Toronto, Ontario
M7A 1T7

Dear Dr. McCalla:

Thank you for your letter of November 25, 1987 regarding the proposed noise regulation.

I have noted your concern that the proposed regulation leaves some issues unresolved. My officials share your concern and I intend to refer the proposed regulation to the Joint Steering Committee on Hazardous Substances in the Workplace. It is therefore very gratifying to learn that you recommend the same action. You may be assured that I will keep you informed of the Joint Steering Committee's deliberations on this issue.

Thank you again for bringing this matter to my attention and for your kind offer of Council's services in resolving these issues.

Yours truly,

Gregory Sorbara
Minister

ADMINISTRATION

Legal Mandate of the Advisory Council

Section 10, the Occupational Health and Safety Act

Advisory Council on Occupational Health and Occupational Safety

10.—(1) There shall be a council to be known as the Advisory Council on Occupational Health and Occupational Safety composed of not fewer than twelve and not more than twenty members appointed by the Lieutenant Governor in Council on the recommendation of the minister.

Term of office of members

(2) The members of the advisory council shall be appointed for such term as the Lieutenant Governor in Council determines and shall be representative of management, labour and technical or professional persons and the public who are concerned with and have knowledge of occupational health and occupational safety.

Chairman and vice-chairman

(3) The Lieutenant Governor in Council shall designate a chairman and a vice-chairman of the advisory council from among the members appointed.

Vacancies

(4) The Lieutenant Governor in Council may fill any vacancy that occurs in the membership of the advisory council.

Remuneration and expenses

(5) The remuneration and expenses of the members of the advisory council shall be determined by the Lieutenant Governor in Council and shall be paid out of the moneys appropriated therefor by the Legislature.

Powers of advisory council

(6) The advisory council, with the approval of the minister, may make rules and pass resolutions governing its procedure, including the calling of meetings, the establishment of a quorum, and the conduct of meetings.

Idem

(7) The function of the advisory council is and it has power,

a) to make recommendations to the minister relating to programs of the ministry in occupational health and occupational safety; and

b) to advise the minister on matters relating to occupationalhealth and occupational safety which may be brought to its attention or be referred to it.

Annual report

(8) The advisory council shall file with the minister not later than the 1st day of June in each year an annual report upon the affairs of the advisory council.

Idem

(9) The minister shall submit the report to the Lieutenant Governor in Council who shall cause the report to be laid before the assembly if it is in session or, if not, at the next ensuing session. 1978, c. 83, s. 10.

Primary objective of advisory council

To advise the Minister of Labour on all matters relative to occupational health and safety in Ontario.

Secondary objectives of advisory council

1. To ensure as far as is possible that the policies and programs in occupational health and safety effectively minimize the risks to health and safety in all workplaces in Ontario.
2. To ensure as far as is possible that knowledge about occupational health and safety is available to management, labour and the public and that it is understood by them.
3. To assist in promoting and establishing mechanisms involving management and labour to solve problems in occupational health and safety.
4. To ensure as far as is possible that there is appropriate manpower training and development for the occupational health and safety field.
5.* To review periodically the effectiveness of the policies and programs implemented to achieve secondary objectives 1 to 4.

Terms of reference of advisory council

1. To make recommendations on matters referred to it by the minister, submitted to it by interested parties or pursued by the council on its own initiative.
2. To advise the minister on programs in the field of occupational health and safety.
3. To advise the minister on policies, principles and procedures used in standard setting and in the development of guidelines to be used by the government.
4. To review and make recommendations to the minister on the introduction of new substances such as chemicals into the workplace.
5. To review and make recommendations on the detection, measurement and control of occupational health and safety hazards in the workplace.
6. To review and make recommendations about the arrangements for occupational health and safety for groups and areas where there are no formal health and safety programs or the programs are judged to be inadequate.
7. To advise the minister on priorities for research and development in occupational health and safety.
8. To advise the minister on priorities for manpower training and development in the field of occupational health and safety.
9. To prepare an annual report to the minister, which shall include the advisory memoranda, recommendations of the council and the government response.

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* *added June 1980*

Meetings of the Advisory Council

April 14, 1987
May 12, 1987
June 9, 1987*
July 21, 1987
September 8, 1987**
October 13, 1987***
November 10, 1987
December 8, 1987
January 12, 1988****†
February 9, 1988††
March 8, 1988†††

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* Included discussion with the chairman, Occupational Health and Safety Education Authority.

** Included discussion with the chairman and the president and chief executive officer, Canadian Centre for Occupational Health and Safety.

*** Followed by dinner meeting with minister and ministry officials.

**** Included discussion with the deputy minister.

† Included discussion with United Steelworkers of America official.

†† Included discussion with ministry and Legal Branch officials.

††† Included discussion with official from CIP Inc., Montreal.

TASK FORCES

TASK FORCES OF ADVISORY COUNCIL ON OCCUPATIONAL HEALTH AND OCCUPATIONAL SAFETY

TASK FORCE ON PRINCIPLES AND PROCEDURES FOR SETTING STANDARDS AND REGULATIONS

Terms of Reference (Original)

To establish guidelines by which council can determine the appropriateness of the principles, policies and procedures used in setting the standards and regulations in occupational health and safety in Ontario.

To include such things as the development of the regulations and public input about those regulations.

Membership for the Review of the Process Used in the Development of the Proposed Regulation Respecting Formaldehyde:

Council Members

D. Ublansky – chairman
R.T. Boldt
J.C. Divitt
W.K.C. Morgan
H.D. Moyer

Others

I. Munro – Canadian Centre for Toxicology, Guelph
H. Shannon – Chedoke McMaster Hospital, Hamilton

Reports to Council

September 8, 1987

Resulting in

Advisory Memorandum 87-IV – September 28, 1987

Membership for the Review of the Process Used in the Development of the Proposed Amendment to the Regulation Respecting Mercury:

Council Members

H.D. Moyer – chairman
T. Byrne
D. Smith
D. Ublansky

Others

B. Gibson – Department of Public Health, Toronto
E. Mastromatteo – Consultant, Toronto

Meetings Held	*Reports to Council*
April 28, 1987	July 21, 1987
May 27, 1987*	
June 23, 1987	

Resulting in

Advisory Memorandum 87–II – August 26, 1987

Membership for the Review of the Process Used in the Development of the Proposed Regulation for Silica – Construction Projects and Aggregate Production and Related Code:

Council Members

T. Byrne – chairman
H.D. Moyer
D. Smith
D. Ublansky

Others

B. Gibson – Department of Public Health, Toronto
E. Mastromatteo – Consultant, Toronto

Meetings Held	*Reports to Council*
April 28, 1987	July 21, 1987
May 27, 1987*	
June 23, 1987	

Resulting In

Advisory Memorandum 87–III – August 26, 1987

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* Meeting with ministry officials.

TASK FORCE ON BIOTECHNOLOGY

Terms of Reference

1) To review concerns associated with biotechnology.
2) To review policies and regulations designed for, or applying to, biotechnology in other jurisdictions.
3) To review the adequacy of current Ontario regulations to protect the health and safety of workers in each stage of the life cycle of biotechnological processes or products.
4) To make recommendations to ensure adequate protection of workers in biotechnology in Ontario.

Membership

Council

R.T. Boldt – chairman
D.R. McCalla
G.M. Nipshagen
C.J. Tuohy
D. Ublansky

Others

D. Burke – Allelix Inc., Mississauga
P. Tocher – Connaught Laboratories (Energy & Chemical Workers Union, Local 67), Willowdale

Reports to Council

May 12, 1987

Resulting in

Advisory Memorandum 87-I – June 12, 1987

TASK FORCE ON MEDICAL EXAMINATIONS

Terms of Reference

1) To review the requirements, application and interpretation of the Act and regulations with respect to medical examinations and clinical tests including:
   - the justification for requiring the examination or test;
   - the communication of the results thereof (which information and to whom);
   - the provisions for disputing the requirements;
   - the role of 'co-ordinating physician';
   - the role of the Chief Physician;
   - the determination of fitness to work;
   - the implications of current legislation governing health professionals and policies, guidelines and practices of the Ontario College of Physicians and Surgeons and the Ontario College of Nurses.
2) To report and make recommendations to council by March 1988.

Members

Council Members

J.L. West – chairman
A.G. Cecutti
A. Dong
W.K.C. Morgan
D. Ublansky

Others

B. Harris, Falconbridge Ltd., Falconbridge
D. Johnson, Algoma Steel (retired), Sault Ste. Marie
J. Turk, Ontario Federation of Labour, Don Mills

Meetings Held	*Reports to Council*
August 24, 1987	December 8, 1987
September 29, 1987[*]	March 8, 1988
November 10, 1987	
November 26, 1987	
January 15, 1988	
February 26, 1988	

Resulting in

Advisory Memorandum 87–V – December 29, 1987
Advisory Memorandum 87–VI – March 18, 1988

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[*] Meeting with ministry officials.

TASK FORCE ON SMALL BUSINESS*

Terms of Reference

1) Review the *Occupational Health and Safety Act* and regulations and the ministry's policies regarding enforcement to identify differences in application for large and small workplaces.
2) Review data regarding the levels of occupational safety and health achieved in small as compared to large workplaces.
3) Review current initiatives to address the problems of health and safety in small workplaces being undertaken by associations, organizations and government departments in Ontario.
4) Review methods used in large companies to deliver health and safety practices to small units within a large workplace and/or to geographically distinct workplaces.
5) Identify significant factors that cause occupational health and safety conditions to differ between small and large workplaces, such as:
   - access to materials, resources and training;
   - motivating factors;
   - current means of disseminating information, etc.
6) Analyse the current policies and initiatives to determine whether they take into account the differences in conditions and whether the goal is uniform protection of health and safety in all workplaces (regardless of size).
7) Recommend strategies and means of implementing strategies to deal with the problems of health and safety in small workplaces.
8) Recommend means of auditing the effectiveness of the strategies (and their implementation) identified in 7.

Membership

Council

D. Dewees – chairman
R.T. Boldt
T. Byrne
D.R. McCalla
D. Morrison
G. Nipshagen (to March 1988)
C. Tuohy
D. Ublansky

Others

J. Brophy — Windsor Occupational Health Information Service, Windsor
J.M. Andrew — Canadian Federation of Independent Business, Willowdale (from March 1988)

Meetings Held

January 26, 1988
February 29, 1988
March 21, 1988

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* The task force was established following a recommendation to council from the *Alternatives Group*.

Alternatives Group Membership

D. Dewees – chairman
R.T. Boldt
T. Byrne (from June 1987)
D.R. McCalla
D. Morrison (from June 1987)
C.J. Tuohy
D. Ublansky

Meetings Held

June 25, 1987
September 15, 1987*
October 8, 1987
October 24, 1987

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* Included meetings with individuals from the Mines Accident Prevention Association of Ontario, the Ontario Hospitals Association and Ontario Health Care Safety Association, the Industrial Accident Prevention Association and the Ad Hoc Industry Group.

TASK FORCE ON OCCUPATIONAL HEALTH AND SAFETY EDUCATION AND TRAINING

Terms of Reference

1) To review current arrangements and structures for occupational health and safety education and training in Ontario and other jurisdictions.
2) To review previous recommendations by council regarding or pertinent to occupational health and safety education and training.
3) To recommend strategies for enhancing the quality, delivery and coverage of education and training for workplace parties, and, in so doing, consider the potential for joint strategies with other government ministries/agencies and means of evaluation.

Membership

D.R. McCalla – chairman
J. Divitt
R. Falconer
G. Nipshagen
H.D. Moyer
C.J. Tuohy

Meetings Held

January 25, 1988
February 29, 1988*

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* Meeting with ministry officials.

Other Meetings - Ad Hoc Task Groups of Council

Small Group*	July 22, 1987 October 9, 1987 December 4, 1987
Amendments Group**	January 25, 1988
Planning Group***	March 7, 1988

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* D.R. McCalla (chairman), J.C. Divitt, R. Falconer (from September 1987), H.D. Moyer, G.M. Nipshagen (from September 1987), C.J. Tuohy.

** J.L. West (chairman), R. Falconer, H.D. Moyer, S. O'Flynn, D.B. Smith.

*** D.R. McCalla (chairman), R. Falconer, H.D. Moyer, S. O'Flynn, D.B. Smith, J.L. West.

APPENDICES

APPENDIX A
Fatal and Non-Fatal Disabling Injuries[1] Initially Settled in Ontario in 1986 and 1987, Classified by Nature of Injury

Nature of Injury	Non-Fatal Disabling Injuries 1986		Fatalities 1986		Non-Fatal Disabling Injuries 1987		Fatalities 1987	
	No.	%	No.	%	No.	%	No.	%
Traumatic Injuries								
Amputation or Enucleation	585	0.30	0	0.00	673	0.33	0	0.00
Asphyxia, Strangulation, Drowning	0	0.00	6	4.03	0	0.00	4	2.05
Burn or Scald — Heat	4,438	2.29	4	2.69	4,599	2.27	3	1.54
Concussion — Brain, Cerebral	364	0.19	0	0.00	332	0.16	0	0.00
Contusion, Crushing, Bruise — Intact Skin	39,692	20.45	75	50.33	40,462	19.95	96	49.23
Cut, Laceration, Puncture — Open Wound	24,547	12.65	0	0.00	25,972	12.81	1	0.51
Dislocation	658	0.34	0	0.00	669	0.33	0	0.00
Electric Shock, Electrocution	220	0.11	9	6.04	250	0.12	6	3.08
Fracture	8,375	4.31	2	1.34	9,013	4.44	4	2.05
Hernia, Rupture	1,789	0.92	0	0.00	1,758	0.87	0	0.00
Scratches, Abrasions — Superficial Wounds	6,274	3.23	0	0.00	6,346	3.13	0	0.00
Sprains, Strains	93,637	48.25	2	1.34	97,686	48.17	2	1.03
Multiple Injuries	1,118	0.58	1	0.67	975	0.48	5	2.56
Occupational Injury, NEC[2]	4,612	2.38	7	4.70	5,368	2.65	8	4.10
Total Traumatic Injuries	186,309	96.0	106	71.14	194,103	95.71	129	66.15
Occupational Diseases/Illnesses								
Burn — Chemical	1,411	0.73	1	0.62	1,463	0.72	0	0.00
Tuberculosis Only	3	0.00	0	0.00	5	0.00	0	0.00
Tuberculosis and Pneumoconiosis	1	0.00	0	0.00	1	0.00	0	0.00
Contagious or Infectious Disease, NEC	310	0.16	0	0.00	379	0.19	0	0.00
Dermatitis	693	0.36	0	0.00	787	0.39	0	0.00
Freezing, Frostbite & Other Envir. Cold	62	0.03	0	0.00	29	0.01	1	0.51
Hearing Loss or Impairment	914	0.47	0	0.00	1,004	0.50	0	0.00
Heat — Sun-Stroke — Envir. Heat	8	0.00	0	0.00	35	0.02	0	0.00
Bursitis	46	0.02	0	0.00	55	0.03	0	0.00
Synovitis, Tenosynovitis	1,380	0.71	0	0.00	1,560	0.77	0	0.00
Inflammation or Irritation of Joints, Tendons, etc. NEC	646	0.33	0	0.00	749	0.37	0	0.00
Poisoning, Systemic	875	0.45	4	2.69	1,087	0.54	2	1.03
Silicosis	23	0.02	1	0.67	6	0.00	1	0.51
Asbestosis	13	0.01	0	0.00	8	0.00	1	0.51
Pneumoconioses, NEC	41	0.02	0	0.00	46	0.02	0	0.00
Radiation Effects	891	0.46	0	0.00	943	0.46	0	0.00
Caisson's Disease	2	0.00	0	0.00	2	0.00	0	0.00
Occupational Illnesses, NEC	135	0.07	35	23.49	164	0.08	56	28.72
Total Diseases/Illnesses	7,454	3.84	41	27.52	8,323	4.10	61	31.28
Non-Personal Damage	61	0.03	0	0.00	59	0.03	0	0.00
Preventative Measures	1	0.00	0	0.00	0	0.00	0	0.00
Nature of Injury Unknown	245	0.13	2	1.34	316	0.16	5	2.56
Total	194,070	100.00	149	100.00	202,801	100.00	195	99.99

1. Claims are considered initially settled when there has been no change in the status of the claim for three months past the end of the month of the last status change.
2. Not elsewhere classified.

Source: Workers' Compensation Board of Ontario.

APPENDIX B

Number of Fatalities[1] and Fatalities per Million Man-hours[2] for Major Industries in Ontario, 1984-1987.

	1984 Number of Fatalities Attributed to:			*1985 Number of Fatalities Attributed to:*			*1986 Number of Fatalities Attributed to:*			*1987 Number of Fatalities Attributed to:*	
Industry[3]	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*	*Fatalities per Million Man-Hours*	*Occupational Disease*	*Trauma*
Agriculture	3	6	0.13	0	6	0.08	0	4	0.06	2	4
Forestry and Logging	0	7	0.35	0	6	0.32	0	7	0.44	0	6
Mining; Quarrying and Oil Wells	15	15	0.39	7	7	0.19	27	13	0.55	7	16
Manufacturing	19	29	0.02	10	43	0.02	21	26	0.02	26	21
Construction	2	27	0.11	8	19	0.09	9	30	0.12	9	35
Transportation, Communication and other Utilities	1	16	0.10	1	14	0.09	3	23	0.14	1	21
Trade	0	10	0.01	1	7	0.01	2	5	0.01	1	7
Community, Business and Personal Service	1	7	*	3	5	*	1	8	*	1	8
Public Administration	0	0	0.00	2	3	0.06	1	1	0.02	2	4
Others (Fishing)	0	1	0.93	0	0	0.00	0	0	0	0	0
All Industries (Schedule I Firms only)	41	118	0.03	32	110	0.02	64	117	0.03	49	122
All Industries (Schedule I & II Firms)	47	129	-	35	122	-	66	127	-	55	130

1. Fatalities include those who received first payment of compensation in 1984, 1985, 1986 and 1987 and were dead by following year-end. 1987 data are provisional.

2. Man-hour figures were derived from the Workers' Compensation Board 'Y277 Final Accident Frequency and Cost Rate by Rate Number Report' for each year. 1987 Y277 man-hour data not available at time of printing.

3. WCB rate groups have been allocated to Statistics Canada's Economic Divisions.

* Represents less than 0.005.

Source: 1984 - 1986 Strategic Policy Unit, Occupational Health and Safety Division, Ministry of Labour
1987 Workers' Compensation Board of Ontario.

APPENDIX C

Number of Injuries[1] per Million Man-hours for Injuries Occurring in Ontario in 1977-1986, Classified by Major Industry.

Industry[2]	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*
Agriculture	32.28	33.52	34.84	36.00	36.08	35.81	40.30	44.66	42.44	44.33
Forestry and Logging	79.05	85.91	79.46	82.39	83.82	74.00	89.84	89.56	74.92	84.85
Mining; Quarries and Oil Wells	63.65	53.24	47.12	62.12	56.23	45.84	45.44	43.53	38.86	37.04
Manufacturing	33.90	34.05	37.25	38.67	36.88	29.92	30.51	35.11	37.30	39.50
Construction	62.11	62.16	65.67	74.88	68.68	49.04	49.55	51.43	52.64	53.16
Transportation and Communication	55.71	57.16	64.05	65.27	62.05	53.75	53.00	58.29	60.05	59.04
Trade, Wholesale and Retail Services	18.09	18.35	18.96	19.15	18.16	16.92	17.29	18.64	19.68	21.20
Services										
Hospital	19.84	19.88	21.81	23.71	22.76	18.96	19.91	21.17	21.21	20.32
Teaching	9.23	8.82	9.78	10.43	10.67	7.87	7.20	8.65	9.08	9.04
Other	10.57	10.61	11.53	12.61	11.91	12.44	13.17	13.98	14.85	15.87
Public Administration	31.70	31.11	32.32	33.82	31.17	32.78	33.56	32.45	30.51	30.03
Others (Fishing)	37.49	38.20	24.25	35.70	28.16	31.75	39.20	33.58	54.92	49.67
All Industries (Schedule I Firms)	28.40	28.07	29.89	31.17	29.37	25.09	25.66	28.32	29.30	30.61

[1] Disabling injury claims with accident dates for a given year (e.g. 1986) compensated by the end of the following year (e.g. 1987). Number of claims and man-hours were derived from the Workers' Compensation Board "Final Accident Frequency and Cost Rate Report" for each year, 1977 to 1986.

[2] WCB rate groups have been allocated to Statistics Canada's Economic Divisions.

Source: 1977 to 1981 – Research Branch, Ministry of Labour.
1982 – Canadian Centre for Occupational Health and Safety.
1983 and 1984 – Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.
1985 and 1986 – Workers' Compensation Board of Ontario.

APPENDIX C-1
Number of Injuries[1] Occurring in Ontario in 1977-1986, Classified by Major Industry.

Industry[2]	*1977*	*1978*	*1979*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*
Agriculture	2,178	2,419	2,481	2,726	2,703	2,474	2,874	3,092	3,007	2,992
Forestry and Logging	1,449	1,721	1,784	1,786	1,663	1,222	1,655	1,770	1,389	1,459
Mining; Quarrying and Oil Wells	5,480	3,877	3,183	4,451	4,056	3,419	3,315	3,387	2,876	2,685
Manufacturing	68,676	69,161	79,000	77,272	73,924	62,349	62,016	76,779	86,009	92,256
Construction	16,791	15,538	15,162	15,161	14,562	12,480	12,465	13,473	15,034	16,628
Transportation and Communication	7,511	7,703	8,525	8,581	8,403	7,924	7,967	9,520	10,381	11,161
Trade, Wholesale and Retail Services	12,835	13,243	17,472	14,652	14,452	13,391	13,737	15,776	17,823	19,629
Services										
Hospital	5,500	5,592	6,278	7,005	7,334	7,377	7,654	8,631	9,343	9,380
Teaching	1,180	1,121	1,172	1,103	1,156	1,237	1,237	1,513	1,857	1,995
Other	9,687	10,028	11,414	12,648	12,526	12,295	12,961	14,711	17,081	18,628
Public Administration	2,892	2,829	2,694	2,504	2,335	2,449	2,714	2,535	2,455	2,424
Others (Fishing)	31	36	27	37	35	34	45	36	49	54
All Industries (Schedule I Firms)	134,210	133,268	146,192	147,926	143,139	126,646	128,646	151,223	167,304	179,291

1. Disabling injury claims with accident dates for a given year (e.g. 1986) compensated by the end of the following year (e.g. 1987). Number of claims were derived from the Workers' Compensation Board "Final Accident Frequency and Cost Rate Number Report" for each year, 1977 to 1986.

2. WCB rate groups have been allocated to Statistics Canada's Economic Divisions.

Source: 1977 to 1981 – Research Branch, Ministry of Labour.
1982 – Canadian Centre for Occupational Health and Safety.
1983 and 1984 – Strategic Policy Unit of the Occupational Health and Safety Division, Ministry of Labour.
1985 and 1986 – Workers' Compensation Board of Ontario.

APPENDIX D

Number of Disabling Injuries and Estimated Disabling Injuries per 100 Employees for Major Occupations in Ontario, Initially Settled[1] in 1986 and 1987.

Occupation[2]	Non-Fatal and Fatal Injuries 1986	Estimated Employment Covered by WCB (000)[3] 1986	Estimated Injuries per 100 Employees Covered by WCB 1986	Non-Fatal and Fatal Injuries 1987	Estimated Employment Covered by WCB (000)[3] 1987	Estimated Injuries per 100 Employees Covered by WCB 1987
Managerial	823	540	0.15	805	566	0.14
Natural Sciences	1,188	159	0.75	1,120	166	0.67
Social Sciences	985	73	1.35	984	77	1.28
Religion	1	12	0.01	5	11	0.05
Teaching	1,367	173	0.79	1,510	182	0.83
Medicine and Health	7,213	184	3.91	7,455	199	3.75
Artistic and Recreational	434	75	0.58	452	89	0.51
Clerical	11,487	719	1.60	12,175	755	1.61
Sales	5,637	413	1.36	5,409	412	1.31
Service	22,191	515	4.31	23,190	517	4.49
Agriculture	3,317	82	4.06	3,120	79	3.95
Fishing, Hunting, Trapping	50	*	*	55	*	*
Forestry and Logging	1,325	8	17.67	1,035	8	12.94
Mining and Quarrying	1,359	18	7.77	1,492	18	8.29
Processing	13,949	131	10.62	14,505	127	11.42
Machining	17,339	110	15.73	18,643	125	14.91
Product Fabricating	31,753	436	7.28	30,975	431	7.19
Construction Trades	17,671	235	7.53	18,289	251	7.29
Transport Equipment Operation	13,870	145	9.59	13,819	162	8.53
Materials Handling	12,740	121	10.53	12,952	128	10.12
Other Crafts and Equipment Operation	2,341	66	3.53	2,563	55	4.66
Not Stated	14,915	–	–	18,855	–	–
Occupations, NEC[4]	12,264	–	–	13,588	–	–
Total Schedule I and II Firms	194,219	4,216	4.61	202,996	4,358	4.66

* Labour Force employment estimates less than 4,000 are not reported.

1. Claims are considered initially settled when there has been no change in the status of the claim for three months past the end of the month of the last status change.
2. From the *Canadian Classification and Directory of Occupations* as used by the WCB.
3. Employment figures are derived from Statistics Canada Labour Force Survey, 1986 and 1987. WCB estimates that approximately 92.5% of the total employed labour force is covered under the provisions of the Worker's Compensation Act. The estimates provided make allowances for some occupations where the coverage may be higher (e.g. mining) and lower (e.g. agriculture)
4. NEC – Not elsewhere classified.

Source: 1986 Workers' Compensation Board of Ontario and Health Studies Service,
Occupational Health and Safety Division, Ministry of Labour.
1987 Workers' Compensation Board of Ontario

APPENDIX D–I

Selected Occupations Defined by Subgroup from the Classification and Dictionary of Occupations as used by WCB

1. *Mining* and quarrying including oil and gas field operations have the following occupational groups included: foremen, rotary well–drilling, other rock and soil drilling, blasting, cutting, handling and loading, labouring and other elemental work, and not elsewhere classified (NEC).

2. *Machining* and related occupations have these groups included: foremen *metal machining*: tool and die making, machinist and machine tool setup, machine tool operating; *metal shaping and forming*: forging, sheet metal workers; welding and flame cutting, boilermakers, platers and structural metal workers; foremen *wood machining*: wood pattern–making, wood sawing and related work, wood sanding; foremen *clay, glass and stone and related materials*: cutting and shaping, abrading and polishing; foremen *other machining* and related work, engravers and etchers, filing, grinding, buffing, cleaning and polishing work, inspecting, testing, grading and sampling occupations.

3. *Forestry* includes these groups of occupations: foremen forestry and logging, forestry conservation, timber cutting, log hoisting, sorting, moving, labouring, forestry and logging NEC, log inspecting, grading and scaling.

4. *Materials handling* has these occupations grouped together: foremen materials handling NEC, hoisting operations NEC, longshoremen, stevedores and freight handlers, materials handling equipment operators NEC, packaging, labouring in materials handling work.

5. *Processing* occupations are composed of: *mineral ore*: treating, crushing and grinding, mixing, filtering, melting and roasting; *metal processing*: smelting, converting and refining, metal heat treating, metal rolling, moulding, coremaking and metal casting, metal extruding and drawing, plating and metal spraying: *clay, glass and stone* furnacemen and kilnmen, separating, grinding, crushing and mixing, forming; *chemicals, petroleum, rubber, plastic and related materials*: mixing and blending, filtering, straining and separating, distilling, subliming and carbonizing, coating and calendarizing; *food, beverage and related*: flour and grain milling, baking, confectionery making, slaughtering and meat cutting, canning, curing and packing, fish canning, curing and packing, fruit and vegetable canning, preserving and packing, milk processing, sugar processing, beverage processing; *Wood*: sawmill sawyers, plywood making, wood treating; *Pulp and paper making*: cellulose preparing, paper–making and finishing; *Textiles*: fibre preparing, spinning, winding, weaving, knitting, bleaching, finishing; *Other*: tobacco, hide and pelt. Foremen, inspecting, testing and grading, elemental labour in all above groups.

6. *Transportation and Equipment* operating occupations have the following sub–groups: air transport, railway transport, water transport, motor transport and the specific occupations in each.

7. *Construction* has these sub–groups: excavating, grading and paving, electrical power, lighting and wire communications equipment erecting,

installing and repairing and construction trades—–carpenters, brick and stone masons, concrete finishing, plasterers, painters and paper hangers, insulating, roofing, pipe–fitting, structural metal erectors, glazers. Foremen inspecting, testing, grading and sampling, and elemental labour are included in the above where appropriate.

8. *Product fabricating* classification is composed of: metal products; electrical, electronic and related equipment; wood products; textile, fur and leather products; rubber, plastic and related products; mechanics and repairmen except electrical; and other: jewellery and silverware, marine craft, paper products, and painting and decorating.

APPENDIX E

Temporary Total Days Lost Up to Initial Settlement for Industries in Ontario 1982–1987[1]

	1982	*1983*	*1984*	*1985*	*1986*	*1987*
Major Economic Divisions	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Agriculture	86.1	93.9	110.4	103.2	120.7	93.3
Forestry and Logging	49.8	69.8	85.1	83.9	100.6	81.2
Fishing, Trapping	0.4	1.6	1.0	1.5	2.2	1.9
Mining, Quarries and Oil Wells	134.4	180.9	179.6	160.6	164.9	167.7
Manufacturing	1,714.8	1,896.7	2,331.9	2,427.0	2,631.0	2,636.2
Construction	636.7	810.5	934.9	900.0	964.0	965.1
Transportation, Communication and other Utilities	409.3	468.1	587.3	578.7	637.9	618.3
Trade	526.5	582.8	735.5	771.5	833.1	852.6
Services*	620.6	699.3	881.6	938.9	105.0	1,054.5
Public Administration	276.9	295.0	348.0	389.0	365.8	385.2
Unknown	–	1.0	0.0	–	–	–
Total**	4,455.4	5,099.6	6,195.3	6,354.2	6,872.6	6,856.0

* Services includes SIC categories Finance, Insurance, Real Estate and Community, Business and Personal Services.

** Total may not add due to rounding.

[1] Shows days lost due to temporary total disability up to initital settlement for claims initially settled in year indicated, by industry (SIC Major Division). Days lost due to death, permanent disability and for medical aid only and light duty (temporary partial disability) are not included. There is no imputation for fatalities.

Source: 1982-83: Canadian Centre for Occupational Health and Safety – from WCB's Statistics System.
1984-87: Worker's Compensation Board of Ontario.

Note: Industry categories in Table E are based on Standard Industrial Classification groupings and differ from industry categories shown in Tables B, C and C-1 which are based on WCB rate groups.

APPENDIX F

Temporary Total Days Lost Up to Initial Settlement by Occupation in Ontario 1982–1987[1]

	1982	*1983*	*1984*	*1985*	*1986*	*1987*
Occupation	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Managerial	21.6	23.3	25.1	23.7	30.1	25.1
Natural Science	22.6	30.8	32.3	30.8	28.3	32.0
Social Science	12.4	12.6	19.2	20.4	22.0	22.6
Religion	0.2	0.9	0.1	0.8	*	*
Teaching	11.3	16.0	17.7	18.5	23.5	22.6
Medicine and Health	149.9	163.4	212.7	230.6	260.4	229.4
Artistic and Recreational	9.8	8.4	10.3	9.9	10.7	13.1
Clerical	171.3	199.9	245.1	264.5	272.1	296.4
Sales	101.5	122.0	140.8	159.4	184.4	168.4
Service	431.0	487.4	603.7	637.9	663.8	698.9
Agriculture	97.3	101.2	129.3	121.7	139.1	108.9
Fishing, Hunting, Trapping	1.0	0.9	1.0	2.1	2.1	1.7
Forestry and Logging	61.4	78.0	89.7	89.2	99.6	81.6
Mining and Quarrying	80.2	114.6	104.5	93.0	98.1	87.1
Processing	319.0	350.3	428.2	425.4	475.1	472.0
Machining	382.6	401.8	483.4	495.8	523.0	529.4
Product Fabricating	649.3	713.7	871.3	942.8	1,043.9	1,062.4
Construction Trades	629.8	798.4	901.5	878.7	954.9	942.3
Transport Equipment Operation	376.0	432.6	523.8	537.6	587.0	555.5
Material Handling	239.7	265.4	353.7	332.1	395.0	392.1
Other Craft and Equipment Operation	42.4	41.5	50.1	50.4	59.0	61.4
Not Stated	295.3	364.1	485.7	513.7	564.4	631.5
Occupation, NEC	349.8	372.3	466.0	475.2	436.2	421.6
Total	4,455.4	5,099.6	6,195.3	6,354.2	6,872.6	6,856.0

* Represents less than 50.

** Totals may not add due to rounding.

[1] Shows days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated, by occupation (OCM 2-digit). Days lost due to death, permanent disability and for medical aid only and light duty (temporary partial disability) are not included. There is no imputation for fatalities.

Source: 1982-83: Canadian Centre for Occupational Health and Safety – from WCB's Statistics System.
1984-87: Worker's Compensation Board of Ontario.

APPENDIX G

Temporary Total Days Lost Up to Initial Settlement by Nature of Injury in Ontario 1982–1987[1]

	1982	*1983*	*1984*	*1985*	*1986*	*1987*
Nature of Injury	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*	*(000)*
Traumatic Injuries						
Amputation or Enucleation	64.8	54.7	67.2	46.0	54.7	54.6
Asphyxia, strangulation, drowning	*	*	*	*	*	*
Burn, scald	51.1	46.9	58.4	59.9	53.5	62.1
Concussion	16.7	22.3	19.9	20.6	20.2	19.8
Contusion, Bruise	374.2	423.6	566.4	775.8	940.4	1,015.0
Cut, laceration	300.0	293.6	356.4	382.5	393.4	430.8
Dislocation	32.3	34.0	33.2	32.5	43.5	40.3
Electric Shock	6.4	6.7	7.5	8.2	6.6	5.9
Fracture	500.0	524.7	560.7	518.6	530.3	565.2
Hernia, rupture	70.0	65.9	69.8	70.9	77.7	75.8
Scratches, abrasions	24.9	25.8	32.7	33.5	34.6	36.4
Sprain, strain	1,720.8	1,937.6	2,659.0	2,941.1	3,574.8	3,677.3
Multiple injuries	99.1	124.9	121.6	121.9	126.2	118.4
Occupational injuries, unspecified	1,000.0	1,332.9	1,377.7	1,116.6	772.8	478.0
Occupational injuries, NEC	2.1	4.5	4.5	3.8	3.7	5.6
Total Traumatic Injuries	4,262.4	4,898.1	5,935.0	6,131.9	6,632.4	6,585.2
Occupational Diseases/Illnesses						
Burn, chemical	8.6	13.0	10.1	10.4	11.5	15.2
Tuberculosis only	0.1	*	0.3	0.4	0.1	0.1
Tuberculosis and pneumoconiosis	*	0	0.1	0	0.2	0.2
Contagious, infectious disease, NEC	4.4	6.9	6.2	4.9	3.9	7.8
Dermatitis	13.4	17.1	19.6	17.9	19.8	22.8
Freezing, frostbite	1.1	1.2	3.0	1.3	1.9	1.1
Hearing loss or impairment	*	*	0.6	*	0.1	0.2
Heat, sun-stroke	0.2	0.1	0.2	*	*	0.2
Bursitis	0.6	1.4	1.6	1.7	3.0	3.7
Synovitis, tenosynovitis	22.2	23.3	31.1	39.8	68.2	88.5
Inflammation, Irritation of Joints, tendons, etc. NEC	9.4	13.9	23.2	25.2	41.4	47.9
Poisoning, systemic	9.0	6.9	5.8	9.6	11.2	14.8
Silicosis	*	0.1	0.6	*	0.7	0.3
Asbestosis	1.1	*	1.4	0.2	0.1	0.6
Pneumoconioses, NEC	2.1	1.7	2.8	2.6	2.5	3.8
Radiation effects	4.5	3.4	2.4	2.7	2.6	3.3
Caisson's disease	*	0.4	*	*	0.1	*
Occupational illnesses, NEC	11.1	11.9	16.9	15.0	17.1	24.7
Total Diseases/Illnesses	87.8	101.3	125.9	131.7	184.4	235.2
Non-personal damage	0.1	0.4	0.5	0.4	0.5	0.6
Preventative measures	*	*	*	*	0.1	0.0
Nature of Injury Unknown	104.9	99.7	133.7	90.1	55.2	35.3
Total**	4,455.4	5,099.6	6,195.3	6,354.2	6,872.6	6,856.0

* Represents less than 50.
** Totals may not add due to rounding of the data.

1. Shows days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated, by nature of injury. Days lost due to death, permanent disability and for medical aid only and light duty (temporary partial disability) are not included. There is no imputation for fatalities.

Source: 1982-83: Canadian Centre for Occupational Health and Safety – from WCB's Statistics System.
1984-87: Worker's Compensation Board of Ontario.

APPENDIX H

Count of Fatal and Non-Fatal and Days of Temporary Total Disability[1] by SIC[2] for Disabling Injury Claims Initially Settled in 1986 and 1987 — WCB Schedule I Employers

	1986				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
011 Livestock and Livestock Combination Farms	2	425	427	18.7	0	395	395	20.5
013 Field Crop and Field Crop Combination Farms	0	463	463	33.9	0	347	347	17.5
015 Fruit and Vegetable Farms	2	233	235	12.4	1	246	247	12.2
017 Other Crop and Livestock Combination Farms	0	510	510	28.5	1	423	424	18.0
019 Miscellaneous Specialty Farms	0	576	576	20.0	*1*	*598*	*599*	*17.5*
02 Farms (except Experimental and Institutional Farms)	*4*	*2,207*	*2,211*	*113.6*	*3*	*2,009*	*2,012*	*85.7*
021 Services Incidental to Agriculture	0	295	295	7.1	0	313	313	7.7
03 Services Incidental to Agriculture	*0*	*295*	*295*	*7.1*	*0*	*313*	*313*	*7.7*
01 Agriculture	**4**	**2,502**	**2,506**	**120.7**	**3**	**2,322**	**2,325**	**93.3**
031 Logging	5	1,159	1,164	100.2	5	978	983	80.2
01 Logging	*5*	*1,159*	*1,164*	*100.2*	*5*	*978*	*983*	*80.2*
039 Forestry Services	0	20	20	0.4	0	18	18	1.0
02 Forestry Services	*0*	*20*	*20*	*0.4*	*0*	*18*	*18*	*1.0*
02 Forestry	**5**	**1,179**	**1,184**	**100.6**	**5**	**996**	**1,001**	**81.2**
041 Fishing	1	36	37	2.1	0	40	40	1.5
01 Fishing	*1*	*36*	*37*	*2.1*	*0*	*40*	*40*	*1.5*
045 Fishery Services	0	2	2	0.1	0	3	3	0.1
02 Fishery Services	*0*	*2*	*2*	*0.1*	*0*	*3*	*3*	*0.1*
047 Hunting and Trapping	0	2	2	0.0	0	3	3	0.3
03 Hunting and Trapping	*0*	*2*	*2*	*0.0*	*0*	*3*	*3*	*0.3*
03 Fishing and Trapping	**0**	**40**	**41**	**2.2**	**0**	**46**	**46**	**1.9**

(continued)

APPENDIX H *(continued)*

INDUSTRY	*1986* *Number of Claims* *Fatal*	 *Non-Fatal*	 *Total*	 *Days of Temporary Total Disability (000)*	*1987* *Number of Claims* *Fatal*	 *Non-Fatal*	 *Total*	 *Days of Temporary Total Disability (000)*
051 Placer Gold Mines	0	5	5	0.1	0	30	30	2.1
052 Gold Quartz Mines	3	237	240	18.4	2	285	287	23.4
057 Uranium Mines	9	434	443	28.0	19	401	420	28.0
058 Iron Mines	0	29	29	0.9	0	29	29	2.1
059 Miscellaneous Metal Mines	8	861	869	73.3	18	894	912	63.7
01 Metal Mines	*20*	*1,566*	*1,586*	*120.6*	*39*	*1,639*	*1,678*	*119.3*
061 Coal Mines	1	1	2	0.8	0	0	0	0.0
064 Crude Petroleum and Natural Gas Industry	0	10	10	0.3	0	15	15	0.2
02 Mineral Fuels	*1*	*11*	*12*	*1.1*	*0*	*15*	*15*	*0.2*
071 Asbestos Mines	0	6	6	0.1	2	3	5	0.4
072 Peat Extraction	0	7	7	0.0	0	10	10	0.3
073 Gypsum Mines	0	5	5	0.0	0	7	7	0.0
079 Miscellaneous Non-Metal Mines	0	111	111	5.3	0	103	103	4.4
03 Non-Metal Mines (except Coal Mines)	*0*	*129*	*129*	*5.4*	*2*	*123*	*125*	*5.1*
083 Stone Quarries	0	75	75	3.8	0	118	118	4.2
087 Sand Pits or Quarries	1	211	212	10.3	1	217	218	9.7
04 Quarries and Sand Pits	*1*	*286*	*287*	*14.1*	*1*	*335*	*336*	*13.9*
096 Contract Drilling for Petroleum	0	14	14	0.2	0	9	9	0.6
098 Other Contract Drilling	0	123	123	7.4	0	174	174	12.5
099 Miscellaneous Services Incidental to Mining	2	193	195	16.0	2	280	282	16.0
05 Services Incidental to Mining	*2*	*330*	*332*	*23.7*	*2*	*463*	*465*	*29.1*
04 Mines (Including Milling) Quarries and Oil Wells	**24**	**2,322**	**2,346**	**164.9**	**44**	**2,575**	**2,619**	**167.7**
101 Meat and Poultry Products Industries	1	2,428	2,429	97.1	1	2,405	2,406	94.4
102 Fish Products Industry	0	107	107	3.1	0	128	128	4.9
103 Fruit and Vegetable Processing Industries	0	935	935	29.7	0	959	959	32.5
104 Dairy Products Industry	0	820	820	26.6	0	882	882	26.3
105 Flour and Breakfast Cereal Products Industry	0	165	165	5.1	0	156	156	5.5
106 Feed Industry	0	342	342	8.1	1	301	302	7.3
107 Bakery Products Industry	1	1,131	1,132	49.7	0	1,101	1,101	48.1
108 Miscellaneous Food Industries	0	1,351	1,351	50.9	0	1,498	1,498	54.3
109 Beverage Industries	1	1,283	1,284	29.7	1	1,319	1,320	31.2
01 Food and Beverage Industries	*3*	*8,562*	*8,565*	*300.0*	*3*	*8,749*	*8,752*	*304.4*

(continued)

APPENDIX H *(continued)*

INDUSTRY	*1986* Number of Claims Fatal	Non-Fatal	Total	Days of Temporary Total Disability (000)	*1987* Number of Claims Fatal	Non-Fatal	Total	Days of Temporary Total Disability (000)
151 Leaf Tobacco Processors	0	15	15	0.5	0	16	16	0.3
153 Tobacco Products Manufacturers	0	102	102	2.3	0	72	72	1.6
02 Tobacco Products Industries	*0*	*117*	*117*	*2.8*	*0*	*88*	*88*	*1.9*
162 Rubber Products Industries	0	1,548	1,548	61.0	0	1,474	1,474	53.5
165 Plastics Fabricating Industry NES	1	3,216	3,217	99.9	1	3,700	3,701	107.4
03 Rubber and Plastics Products Industries	*1*	*4,764*	*4,765*	*160.9*	*1*	*5,174*	*5,175*	*160.9*
172 Leather Tanneries	0	172	172	7.7	0	127	127	5.8
174 Shoe Factories	0	323	323	13.7	0	329	329	12.6
175 Leather Glove Factories	0	16	16	1.5	0	10	10	0.1
179 Luggage Handbag and Small Leather Goods Manufacturers	0	281	281	10.2	0	287	287	9.4
04 Leather Industries	*0*	*792*	*792*	*33.1*	*0*	*753*	*753*	*28.0*
181 Cotton Yarn and Cloth Mills	0	175	175	6.7	0	143	143	2.7
182 Wool Yarn and Cloth Mills	0	125	125	5.6	0	120	120	2.7
183 Manmade Fibre Yarn and Cloth Mills	1	299	300	9.5	1	298	299	9.5
184 Cordage and Twine Industry	0	32	32	0.6	0	49	49	0.9
185 Felt and Fibre Processing Mills	0	72	72	4.4	0	81	81	4.7
186 Carpet Mat and Rug Industry	0	268	268	8.9	0	312	312	11.8
187 Canvas Products and Cotton and Jute Bags Industry	0	79	79	4.3	0	74	74	2.7
188 Automobile Fabric Accessories Inudstry	0	182	182	7.8	0	186	186	6.5
189 Miscellaneous Textile Industries	0	670	670	24.0	0	659	659	27.0
05 Textile Industries	*1*	*1,902*	*1,903*	*71.7*	*1*	*1,922*	*1,923*	*68.6*
231 Hosiery Mills	0	94	94	6.8	0	96	96	3.8
239 Knitting Mills Except Hosiery Mills	0	256	256	7.8	0	378	378	9.3
06 Knitting Mills	*0*	*350*	*350*	*14.6*	*0*	*474*	*474*	*13.1*
243 Men's Clothing Industries	0	472	472	22.5	0	490	490	23.8
244 Women's Clothing Industries	0	192	192	10.7	0	214	214	9.1
245 Children's Clothing Industry	0	45	45	2.7	0	46	46	3.4
246 Fur Goods Industry	0	8	8	0.6	0	16	16	3.0
248 Foundation Garment Industry	0	31	31	1.2	0	22	22	0.3
249 Miscellaneous Clothing Industries	0	249	249	10.3	0	262	262	11.4
07 Clothing Industries	*0*	*997*	*997*	*48.0*	*0*	*1,050*	*1,050*	*51.0*

(continued)

APPENDIX H *(continued)*

INDUSTRY	*1986*				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
	Fatal	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
251 Sawmills Planing Mills and Shingle Mills	1	970	971	39.9	5	812	817	34.6
252 Veneer and Plywood Mills	0	140	140	6.2	0	204	204	9.5
254 Sash Door and Other Millwork Plants	0	1,337	1,337	33.6	0	1,672	1,672	43.6
256 Wooden Box Factories	0	281	281	6.5	0	273	273	5.8
258 Coffin and Casket Industry	0	25	25	0.4	0	19	19	0.4
259 Miscellaneous Wood Industries	0	479	479	15.3	0	552	552	14.2
08 Wood Industries	*1*	*3,232*	*3,233*	*101.9*	*5*	*3,532*	*3,537*	*108.1*
261 Household Furniture Manufacturers	0	1,558	1,558	63.2	0	1,882	1,882	55.9
264 Office Furniture Manufacturers	0	464	464	9.3	0	520	520	12.2
266 Miscellaneous Furniture and Fixtures Manufacturers	0	926	926	27.3	0	975	975	34.3
268 Electric Lamp and Shade Manufacturers	0	49	49	1.8	0	42	42	1.3
09 Furniture and Fixture Industries	*0*	*2,997*	*2,997*	*101.6*	*0*	*3,419*	*3,419*	*103.6*
271 Pulp and Paper Mills	1	779	780	51.7	3	629	632	36.5
272 Asphalt Roofing Manufacturers	0	35	35	1.2	0	50	50	2.3
273 Paper Box and Bag Manufacturers	1	959	960	30.8	1	972	973	37.6
274 Miscellaneous Paper Converters	0	818	818	25.9	0	854	854	27.3
10 Paper and Allied Industries	*2*	*2,591*	*2,593*	*109.6*	*4*	*2,505*	*2,509*	*103.7*
286 Commercial Printing	0	1,462	1,462	36.1	0	1,474	1,474	37.9
287 Platemaking Typsetting and Trade Industries	0	152	152	2.9	0	128	128	3.7
288 Publishing Only	0	134	134	3.9	0	176	176	4.4
289 Publishing and Printing	0	334	334	7.0	1	335	336	8.4
11 Printing Publishing and Allied Industries	*0*	*2,082*	*2,082*	*49.9*	*1*	*2,113*	*2,114*	*54.5*
291 Iron and Steel Mills	3	2,792	2,795	134.7	1	2,708	2,709	114.2
292 Steel Pipe and Tube Mills	0	323	323	11.8	0	301	301	10.1
294 Iron Foundries	1	915	916	22.2	1	939	940	24.0
295 Smelting and Refining	0	133	133	15.0	0	82	82	7.4
296 Aluminum rolling Casting and Extruding	0	424	424	13.3	0	330	330	11.6
297 Copper and Copper Alloy Rolling Casting and Extruding	1	241	242	4.6	0	230	230	6.4
298 Metal Rolling Casting and Extruding NES	1	615	616	17.2	0	687	687	21.8
12 Primary Metal Industries	*6*	*5,443*	*5,449*	*218.7*	*2*	*5,277*	*5,279*	*195.4*

(continued)

APPENDIX H *(continued)*

	1986				1987			
	Number of Claims			*Days of Temporary*	*Number of Claims*			*Days of Temporary*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*	*Total Disability (000)*	*Fatal*	*Non-Fatal*	*Total*	*Total Disability (000)*
301 Boiler and Plate Works	0	390	390	11.2	2	440	442	14.0
302 Fabricated Structural Metal Industry	0	876	876	39.4	2	791	793	28.6
303 Ornamental and Architectural Metal Industry	0	975	975	36.5	0	1,106	1,106	41.6
304 Metal Stamping, Pressing and Coating Industry	2	3,089	3,091	94.3	0	3,597	3,597	95.2
305 Wire and Wire Products Manufacturers	0	973	973	29.6	0	1,025	1,025	30.4
306 Hardware Tool and Cutlery Manufacturers	1	1,570	1,571	42.0	0	1,533	1,533	41.5
307 Heating Equipment Manufactuers	0	492	492	12.3	0	447	447	16.2
308 Machine Shops	0	1,367	1,367	40.7	1	1,281	1,282	37.4
309 Miscellaneous Metal Fabricating Industries	0	2,312	2,312	69.8	0	2,429	2,429	74.8
13 Metal Fabricating Ind. (Except Machinery and Transportation Equipment)	*3*	*12,044*	*12,047*	*375.8*	*5*	*12,649*	*12,654*	*379.8*
311 Agricultural Implement Industry	0	482	482	29.2	0	582	582	20.6
315 Miscellaneous Machinery and Equipment Manufacturing	4	3,414	3,418	92.1	2	3,598	3,600	88.6
316 Commercial Refrigeration & Air Conditioning Equipment	0	200	200	6.1	0	210	210	6.7
318 Office and Store Machinery Manufacturers	0	199	199	3.6	0	198	198	5.2
14 Machinery Industries (Except Electrical Machinery)	*4*	*4,295*	*4,299*	*131.0*	*2*	*4,588*	*4,590*	*121.1*
321 Aircarft and Aircraft Parts Manufacturers	0	1,232	1,232	34.3	1	1,510	1,511	40.5
323 Motor Vehicle Manufacturers	1	8,109	8,110	292.6	0	8,052	8,052	313.9
324 Truck Body and Trailer Manufacturers	1	1,077	1,078	25.8	0	1,115	1,115	23.1
325 Motor Vehicle Parts and Accessories Manufacturers	2	5,840	5,842	170.6	0	5,967	5,967	174.5
326 Railroad Rolling Stock Industry	0	530	530	22.4	0	579	579	14.1
327 Shipbuilding and Repair	0	128	128	4.0	1	124	125	5.6
328 Boatbuilding and Repair	0	317	317	4.8	0	237	237	7.6
329 Miscellaneous Vehicle Manufacturers	0	71	71	1.5	0	32	32	2.4
15 Transportation Equipment Industries	*4*	*17,304*	*17,308*	*556.2*	*2*	*17,616*	*17,618*	*581.8*
331 Manufacturers of Small Electric Appliances	1	247	248	14.1	0	200	200	8.6
332 Manufacturers of Major Applicances Electric & Non-Electric	0	577	577	28.0	0	623	623	21.8
333 Manufacturers of Lighting Fixtures	1	179	180	5.4	0	195	195	9.3
334 Manufacturers of Household Radio and Television	0	272	272	7.7	0	355	355	12.6
335 Communications Equipment Manufacturers	1	656	657	18.9	1	762	763	20.7

(continued)

APPENDIX H *(continued)*

INDUSTRY	*1986*				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
	Fatal	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
336 Manufacturers of Electrical Industrial Equipment	1	1,088	1,089	40.4	2	1,180	1,182	40.7
338 Manufacturers of Electric Wire and Cable	0	120	120	6.2	0	148	148	6.3
339 Manufacturers of Miscellaneous Electrical Products	0	652	652	19.4	0	585	585	17.9
16 Electrical Products Industry	*4*	*3,791*	*3,795*	*140.3*	*3*	*4,048*	*4,051*	*137.8*
351 Clay Products Manufacturers	0	151	151	4.8	0	189	189	4.3
352 Cement Manufacturers	1	70	71	3.4	1	74	75	1.4
353 Stone Products Manufacturers	0	36	36	1.7	0	40	40	1.7
354 Concrete Products Manufacturers	1	565	566	23.5	0	586	586	21.4
355 Ready Mix Concrete Manufacturers	3	307	310	12.3	1	388	389	13.8
356 Glass and Glass Products Manufacturers	1	877	878	31.9	0	1,042	1,042	28.7
357 Abrasives Manufacturers	0	137	137	5.6	0	141	141	7.0
358 Lime Manufacturers	0	5	5	2.0	0	7	7	0.1
359 Miscellaneous Non-Metallic Mineral Products Industries	2	529	531	17.4	4	503	507	25.1
17 Non-Metallic Mineral Products Industries	*8*	*2,677*	*2,685*	*102.7*	*6*	*2,970*	*2,976*	*103.5*
365 Petroleum Refineries	1	94	95	3.6	0	80	80	3.0
369 Miscellaneous Petroleum and Coal Products Industries	0	15	15	0.7	0	19	19	0.5
18 Petroleum and Coal Products Industries	*1*	*109*	*110*	*4.3*	*0*	*99*	*99*	*3.6*
372 Manufacturers of Mixed Fertilizers	0	34	34	2.1	0	45	45	1.8
373 Manufacturers of Plastics and Synthetic Resins	1	167	168	3.6	0	170	170	5.0
374 Manufacturers of Pharmaceuticals and Medicines	0	309	309	7.4	0	302	302	8.3
375 Paint and Varnish Manufacturers	0	209	209	7.8	0	237	237	5.2
376 Manufacturers of Soap and Cleaning Compounds	0	158	158	4.9	0	133	133	5.0
377 Manufacturers of Toilet Preparations	0	154	154	4.7	0	158	158	6.1
378 Manufacturers of Industrial Chemicals	2	271	273	10.1	0	286	286	10.6
379 Miscellaneous Chemical Industries	1	511	512	14.3	0	510	510	12.0
19 Chemical and Chemical Products Industries	*4*	*1,813*	*1,817*	*54.8*	*0*	*1,841*	*1,841*	*54.0*
391 Scientific and Professional Equipment Industries	0	459	459	13.6	0	523	523	18.1
392 Jewellery and Silverware Industry	0	166	166	4.9	0	149	149	6.4
393 Sporting Goods and Toy Industries	0	311	311	11.9	0	327	327	9.7
397 Signs and Displays Industry	0	270	270	9.2	0	274	274	11.5
399 Miscellaneous Manufacturing Industries NES	0	469	469	12.4	0	540	540	14.7
20 Miscellaneous Manufacturing Industries	*0*	*1,675*	*1,675*	*52.0*	*0*	*1,813*	*1,813*	*60.4*
05 Manufacturing Industries	**42**	**77,537**	**77,579**	**2,630.0**	**35**	**80,680**	**80,715**	**2,635.1**

(continued)

APPENDIX H *(continued)*

	1986				*1987*			
INDUSTRY	*Number of Claims Fatal*	*Non-Fatal*	*Total*	*Days of Temporary Total Disability (000)*	*Number of Claims Fatal*	*Non-Fatal*	*Total*	*Days of Temporary Total Disability (000)*
404 Building Construction	3	3,761	3,764	230.5	7	4,202	4,209	226.6
406 Highway Bridge and Street Construction	0	744	744	65.9	4	702	706	61.0
409 Other Construction	1	878	879	70.2	10	841	851	67.9
01 General Contractors	*4*	*5,383*	*5,387*	*366.6*	*21*	*5,745*	*5,766*	*355.5*
421 Special Trade Contractors	18	10,814	10,832	597.3	28	12,393	12,421	609.1
02 Special-Trade Contractors	*18*	*10,814*	*10,832*	*597.3*	*28*	*12,393*	*12,421*	*609.1*
06 Construction Industry	**22**	**16,197**	**16,219**	**964.0**	**49**	**18,138**	**18,187**	**964.6**
501 Air Transport	2	349	351	8.8	4	429	433	9.3
502 Services Incidental to Air Transport	0	85	85	2.5	0	132	132	3.4
503 Railway Transport	0	22	22	0.8	0	14	14	0.2
504 Water Transport	0	103	103	1.5	0	75	75	2.4
505 Services Incidental to Water Transport	0	78	78	7.0	0	62	62	4.5
506 Moving and Storage Used Goods Uncrated	1	551	552	16.1	0	523	523	18.2
507 Other Truck Transport	10	5,477	5,487	241.3	14	5,195	5,209	216.4
508 Bus Transport Interurban and Rural	0	188	188	8.4	0	129	129	8.2
509 Urban Transit Systems	0	166	166	3.3	0	178	178	4.3
512 Taxicab Operations	0	72	72	4.1	1	92	93	7.7
515 Pipeline Transport	0	21	21	0.4	0	18	18	0.5
516 Highway and Bridge Maintenance	0	53	53	1.7	0	52	52	1.4
517 Miscellaneous Services Incidental to Transportation	0	209	209	9.2	1	158	159	6.1
519 Other Transportation	0	417	417	18.2	0	467	467	17.5
01 Transportation	*13*	*7,791*	*7,804*	*323.2*	20	7,524	7,544	300.0
524 Grain Elevators	0	130	130	5.8	*0*	*151*	*151*	*7.6*
527 Other Storage and Warehousing	0	459	459	11.1	0	443	443	11.1
02 Storage	*0*	*589*	*589*	*16.9*	0	594	594	18.7
543 Radio and Television Broadcasting	1	146	147	2.5	*0*	*176*	*176*	*3.3*
544 Telephone Systems	0	16	16	0.3	1	24	25	0.4
545 Telegraph and Cable Systems	0	2	2	0.2	0	0	0	0.0
548 Post Office	0	17	17	0.4	0	12	12	0.3
03 Communications	*0*	*182*	*182*	*3.4*	*1*	*212*	*213*	*3.9*

(continued)

APPENDIX H *(continued)*

INDUSTRY	*1986*				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
	Fatal	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
572 Electric Power	1	288	289	8.8	0	289	289	7.8
574 Gas Distribution	1	213	214	3.5	0	156	156	2.9
576 Water Systems	0	65	65	1.5	0	60	60	1.6
579 Other Utilities	0	390	390	11.0	0	372	372	11.8
04 Electric Power, Gas and Water Utilities	*2*	*956*	*958*	*24.8*	*0*	*877*	*877*	*24.1*
07 Transportation, Communications and Other Utilities	**16**	**9,517**	**9,533**	**368.3**	**21**	**9,207**	**9,228**	**346.7**
602 Wholesalers of Farm Products	0	137	137	3.3	0	121	121	3.7
606 Wholesalers of Coal and Coke	1	24	25	1.4	0	13	13	0.9
608 Wholesalers of Petroleum Products	1	233	234	7.8	0	261	261	8.6
611 Wholesalers of Paper and Paper Products	0	219	219	4.8	0	288	288	5.5
612 Wholesalers of General Merchandise	0	9	9	0.1	0	14	14	0.3
614 Wholesalers of Food	2	1,472	1,474	59.7	1	1,736	1,737	54.2
615 Wholesalers of Tobacco Products	0	63	63	1.2	0	77	77	2.6
616 Wholesalers of Drugs and Toilet Preparations	0	175	175	4.9	0	158	158	6.1
617 Wholesalers of Apparel and Dry Goods	0	232	232	8.3	0	174	174	6.0
618 Wholesalers of Household Furniture and Furnishings	0	91	91	2.1	0	81	81	3.4
619 Wholesalers of Motor Vehicles and Accessories	2	1,441	1,443	36.8	0	1,545	1,545	43.9
621 Wholesalers of Electrical Machinery and Equipment NES	0	344	344	9.5	0	354	354	10.4
622 Wholesalers of Farm Machinery and Equipment	0	240	240	6.5	1	212	213	4.3
623 Wholesalers of Machinery and Equipment NES	0	1,274	1,274	34.1	1	1,432	1,433	42.8
624 Wholesalers of Hardware Plumbing and Heating	0	595	595	17.4	0	613	613	17.7
625 Wholesalers of Metal and Metal Products NES	0	371	371	13.5	0	399	399	10.1
626 Wholesalers of Lumber and Building Materials	2	1,580	1,582	43.3	1	1,807	1,808	52.8
627 Wholesalers of Scrap and Waste Materials	1	564	565	21.2	1	498	499	16.7
629 Wholesalers NES	1	1,233	1,234	42.6	0	1,385	1,385	40.2
01 Wholesale Trade	*10*	*10,297*	*10,307*	*318.7*	*5*	*11,168*	*11,173*	*330.1*
631 Food Stores	1	4,990	4,991	147.9	1	5,159	5,160	153.9
642 General Merchandise Stores	2	3,679	3,681	90.6	0	3,893	3,893	88.2
652 Tire Battery and Accessories Stores	0	766	766	17.6	1	736	737	17.2
654 Gasoline Service Stations	1	1,456	1,457	53.0	2	1,288	1,290	38.5

(continued)

APPENDIX H *(continued)*

	1986				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
656 Motor Vehicle Dealers	0	1,332	1,332	25.9	0	1,310	1,310	29.3
658 Motor Vehicle Repair Shops	0	2,109	2,109	59.5	0	2,059	2,059	61.6
663 Shoe Stores	0	159	159	5.3	0	162	162	7.3
665 Men's Clothing Stores	0	177	177	5.4	0	203	203	5.7
667 Women's Clothing Stores	0	104	104	4.2	0	138	138	4.5
669 Clothing and Dry Goods Stores NES	0	142	142	6.0	0	143	143	8.3
673 Hardware Stores	0	231	231	5.1	0	217	217	5.8
676 Household Furniture and Appliance Stores	1	823	824	27.3	0	893	893	27.4
678 Radio Television and Electrical Appliance Repair Shops	0	81	81	3.8	0	94	94	3.1
681 Drug Stores	0	348	348	7.7	0	412	412	9.2
691 Book and Stationery Stores	0	60	60	1.6	0	59	59	1.4
692 Florists Shops	0	112	112	4.1	0	106	106	3.8
694 Jewellery Stores	0	15	15	0.8	0	28	28	0.6
695 Watch and Jewellery Repair Shops	0	3	3	0.0	0	7	7	0.4
696 Liquor Wine and Beer Stores	0	323	323	6.5	0	343	343	7.4
6[illegible] Tobacconists	0	32	32	1.1	0	35	35	1.8
699 Retail Stores NES	0	1,101	1,101	30.5	0	1,107	1,107	35.9
02 Retail Trade	*5*	*18,040*	*18,045*	*504.4*	*4*	*18,392*	*18,396*	*511.4*
08 Trade	**15**	**28,340**	**28,355**	**822.7**	**9**	**29,560**	**29,569**	**841.5**
701 Banks and Other Deposit Accepting Establishments	0	182	182	5.5	0	125	125	4.6
703 Other Credit Agencies	0	1	1	0.0	0	0	0	0.0
705 Security Brokers and Dealers Including Exchange	0	1	1	0.0	0	1	1	0.0
707 Investment and Holdings Companies	0	286	286	12.6	0	326	326	7.7
01 Finance Industries	*0*	*470*	*470*	*18.0*	*0*	*452*	*452*	*12.3*
721 Insurance Carriers	0	42	42	0.5	0	40	40	1.7
02 Insurance Carriers	*0*	*42*	*42*	*0.5*	*0*	*40*	*40*	*1.7*
735 Insurance and Real Estate Agencies	0	55	55	1.6	0	44	44	1.7
737 Real Estate Operators	0	956	956	41.9	4	979	983	41.9
03 Insurance Agencies and Real Estate Industries	*0*	*1,011*	*1,011*	*43.5*	*4*	*1,027*	*1,027*	*43.6*
09 Finance, Insurance and Real Estate	**0**	**1,523**	**1,523**	**62.0**	**4**	**1,515**	**1,519**	**57.6**

(continued)

APPENDIX H *(continued)*

INDUSTRY	1986				1987			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
	Fatal	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
801 Kindergartens and Nursery Schools	0	118	118	2.5	0	114	114	3.3
802 Elementary and Secondary Schools	0	1,805	1,805	42.8	0	1,935	1,935	45.2
803 Schools of Art and of the Performing Arts	0	1	1	0.0	0	2	2	0.0
804 Vocational Centres Trade Schools and Business	0	102	102	0.8	0	102	102	1.8
805 Post Secondary, Non University Educational Institutions	0	424	424	5.6	1	456	456	6.8
806 Universities and Colleges	0	675	675	16.6	1	640	641	14.7
807 Libraries Museums and Other Repositories	0	65	65	1.6	0	92	92	1.8
809 Education and Related Services NES	0	41	41	1.2	0	50	50	1.1
01 Education and Related Services	*0*	*3,231*	*3,231*	*71.1*	*2*	*3,390*	*3,392*	*74.8*
821 Hospitals	0	5,103	5,103	167.4	0	5,492	5,492	163.0
822 Related Health Care Institutions	0	1,306	1,306	54.7	0	1,187	1,187	41.0
823 Offices of Physicians and Surgeons	0	37	37	1.2	0	54	54	1.7
824 Offices of Paramedical Personnel Practitioners	0	52	52	2.3	0	53	53	3.1
825 Offices of Dentists	0	4	4	0.0	0	4	4	0.7
826 Diagnostic and Therapeutic Services NES	0	172	172	4.5	0	177	177	6.1
827 Miscellaneous Health Services	0	142	142	7.3	0	144	144	3.0
828 Welfare Organizations	0	2,878	2,878	74.0	1	2,756	2,757	76.8
02 Health and Welfare Services	*0*	*9,194*	*9,194*	*311.4*	*1*	*9,867*	*9,868*	*295.5*
831 Religious Organizations	0	70	70	4.6	0	66	66	3.2
03 Religious Organizations	*0*	*70*	*70*	*4.6*	*0*	*66*	*66*	*3.2*
841 Motion Picture Theatres	0	36	36	1.1	0	24	24	0.8
842 Motion Picture Production and Distribution	0	34	34	1.1	0	47	47	1.6
843 Bowling Alleys and Billiard Parlours	0	32	32	1.7	0	28	28	1.5
844 Golf Clubs and Country Clubs	1	162	163	3.7	0	133	133	3.9
845 Theatrical and Other Staged Entertainment Services	0	17	17	0.3	0	20	20	0.6
849 Miscellaneous Amusement and Recreation Services	0	413	413	7.8	0	456	456	9.8
04 Amusement and Recreation Services	*1*	*694*	*695*	*15.8*	*0*	*708*	*708*	*18.2*
851 Employment Agencies and Personnel Suppliers	0	933	933	27.3	0	1,137	1,137	30.9
853 Computer Services	0	47	47	0.7	0	72	72	1.5
855 Security and Investigation Services	0	1,089	1,089	31.0	0	1,218	1,218	30.5
861 Offices of Accountants	1	43	44	2.0	0	45	45	4.8

(continued)

APPENDIX H *(continued)*

	1986				1987			
	Number of Claims			*Days of Temporary*	*Number of Claims*			*Days of Temporary*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*	*Total Disability (000)*	*Fatal*	*Non-Fatal*	*Total*	*Total Disability (000)*
862 Advertising Services	0	82	82	1.9	0	112	112	2.7
863 Offices of Architects	0	5	5	0.2	0	10	10	0.2
864 Engineering and Scientific Services	2	391	393	11.5	0	447	447	11.1
866 Offices of Lawyers and Notaries	0	2	2	0.0	0	5	5	0.1
867 Offices of Management and Business Consultants	0	167	167	4.1	0	209	209	5.7
869 Miscellaneous Services to Business Management	0	903	903	31.2	1	901	902	30.4
05 Services to Business Management	*3*	*3,662*	*3,665*	*110.0*	*1*	*4,156*	*4,157*	*118.0*
871 Shoe Repair Shops	0	64	64	2.2	0	31	31	1.2
872 Barber and Beauty Shops	0	14	14	0.4	0	17	17	2.1
873 Private Households	0	103	103	4.0	0	105	105	3.5
874 Laundries, Cleaners and Pressers Except Self Serve	0	480	480	24.3	0	497	497	25.6
876 Self Service Laundries and Dry Cleaners	0	18	18	0.3	0	21	21	0.2
877 Funeral Services	0	69	69	2.9	0	81	81	1.6
879 Miscellaneous Personal Services	0	97	97	4.9	0	93	93	5.0
06 Personal Services	*0*	*845*	*845*	*38.8*	*0*	*845*	*845*	*39.3*
881 Hotels and Motels	0	1,909	1,909	56.2	0	1,927	1,927	63.4
883 Lodging Houses and Residential Clubs	0	16	16	0.8	0	9	9	0.2
884 Camping Grounds and Trailer Parks	0	46	46	1.6	0	58	58	1.5
886 Restaurants Caterers and Taverns	1	7,121	7,122	177.7	3	7,675	7,678	189.3
07 Accommodation and Food Services	*1*	*9,092*	*9,093*	*236.3*	*3*	*9,669*	*9,672*	*254.4*
891 Labour Orgnizations and Trade Associations	0	210	210	8.4	0	187	187	3.5
893 Photographic Services NES	0	66	66	1.7	0	63	63	1.9
894 Automobile and Truck Rental	1	180	181	4.8	1	185	186	3.7
895 Machinery and Equipment Rental	0	315	31	12.2	0	338	338	14.3
896 Blacksmithing and Welding Shops	0	314	314	10.9	0	306	306	11.5
897 Miscellaneous Repair Shops	0	190	190	6.1	0	210	210	6.5
898 Services to Buildings and Dwellings	1	1,423	1,424	79.2	0	1,350	1,350	73.2
899 Miscellaneous Services NES	0	405	405	14.4	1	468	469	12.5
08 Miscellaneous Services	*2*	*3,103*	*3,105*	*137.8*	*2*	*3,107*	*3,109*	*127.1*
10 Community, Business and Personal Service Industries	**7**	**29,891**	**29,898**	**925.7**	**9**	**31,808**	**31,817**	**930.5**

(continued)

APPENDIX H *(continued)*

	1986				1987			
INDUSTRY	*Number of Claims*			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
	Fatal	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
902 Defence Services	0	13	13	0.1	0	25	25	1.5
909 Other Federal Administration	0	44	44	1.0	0	40	40	0.9
01 Federal Administration	*0*	*57*	*57*	*1.1*	*0*	*65*	*65*	*2.5*
931 Provincial Administration	0	28	28	0.4	0	28	28	0.4
02 Provincial Administration	*0*	*28*	*28*	*0.4*	*0*	*28*	*28*	*0.4*
951 Local Administration	1	2,651	2,652	76.4	4	2,462	2,466	71.3
03 Local Administrtion	*1*	*2,651*	*2,652*	*76.4*	*4*	*2,462*	*2,466*	*71.3*
11 Public Administration	**1**	**2,646**	**2,647**	**77.8**	**4**	**2,555**	**2,559**	**74.2**
Total for Schedule 1	**137**	**171,694**	**171,831**	**6,238.9**	**183**	**179,402**	**179,585**	**6,194.4**

1. Days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated. Totals may not add due to rounding.
2. Industry Classification: Standard Industrial Classification 1970.

Source: Workers' Compensation Board of Ontario.

APPENDIX I

Count of Fatal and Non–Fatal and Days of Temporary Total Disability[1] by SIC[2] for Disabling Injury Claims Initially Settled in 1986 and 1987 – WCB Schedule II Employers

	1986				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
INDUSTRY	*Fatal*	*Non–Fatal*	*Total*		*Fatal*	*Non–Fatal*	*Total*	
295 Smelting and Refining	0	33	33	0.9	1	33	34	0.6
12 Primary Metal Industries	*0*	*33*	*33*	*0.9*	*1*	*33*	*34*	*0.6*
304 Metal Stamping Pressing and Coating Industry	0	5	5	0.1	0	26	26	0.4
13 Metal Fabricating Ind. (Except machinery and Transportation)	*0*	*5*	*5*	*0.1*	*0*	*26*	*26*	*0.4*
05 Manufacturing Industries	**0**	**38**	**38**	**1.0**	**1**	**59**	**60**	**1.0**
421 Special Trade Contractors					0	1	1	0.5
02 special Trade Contractors					*0*	*1*	*1*	*0.5*
06 Construction Industry					**0**	**1**	**1**	**0.5**
501 Air Transport	0	590	590	16.1	0	834	834	18.9
503 Railway Transport	2	1,602	1,604	83.2	6	1,359	1,365	74.7
504 Water Transport	0	135	135	12.5	0	103	103	13.9
505 Services Incidental to Water Transport	0	174	174	11.4	1	95	96	7.7
507 Other Truck Transport	0	5	5	1.0	0	2	2	2.4
509 Urban Transit Systems	0	712	712	20.9	0	850	850	25.9
516 Highway and Bridge Maintenance	0	2	2	0.0	0	0	0	0.0
517 Miscellaneous Services Incidental to Transportation	0	12	12	0.3	0	11	11	0.5
519 Other Transportation	0	134	134	5.4	0	116	116	2.4
01 Transportation	*2*	*3,366*	*3,368*	*150.7*	*7*	*3,370*	*3,377*	*146.4*
543 Radio and Television Broadcasting	0	53	53	0.8	0	40	40	0.7
544 Telephone Systems	0	259	259	6.1	0	269	269	5.8
545 Telegraph and Cable Systems	0	26	26	0.9	0	39	39	0.7
548 Post Office	0	3,054	3,054	60.0	0	3,270	3,270	69.6
03 Communications	*0*	*3,392*	*3,392*	*67.7*	*0*	*3,618*	*3,618*	*76.9*

(continued)

APPENDIX I *(continued)*

INDUSTRY	*1986*				*1987*			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
	Fatal	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
572 Electric Power	0	1,188	1,188	51.0	0	1,104	1,104	48.3
576 Water Systems	0	7	7	0.1	0	10	10	0.0
04 Electric Power, Gas and Water Utilities	*0*	*1,195*	*1,195*	*51.2*	*0*	*1,114*	*1,114*	*48.3*
07 Transportation, Communication and Other Utilities	**2**	**7,953**	**7,955**	**269.6**	**7**	**8,102**	**8,109**	**271.6**
696 Liquor, Wine and Beer Stores	0	364	364	10.4	0	393	393	11.1
699 Retail Stores NES	0	0	0	0	0	1	1	0.0
02 Retail Trade	*0*	*364*	*364*	*10.4*	*0*	*394*	*394*	*11.1*
08 Trade	**0**	**364**	**364**	**10.4**	**0**	**394**	**394**	**11.1**
703 Other Credit Agencies	0	15	15	0.2	0	14	14	0.2
01 Finance Industries	*0*	*15*	*15*	*0.2*	*0*	*14*	*14*	*0.2*
721 Insurance Carriers	0	18	18	0.2	0	20	20	0.8
02 Insurance Carriers	*0*	*18*	*18*	*0.2*	*0*	*20*	*20*	*0.8*
737 Real Estate Operators	0	62	62	2.3	0	64	64	3.2
03 Insurance Agencies and Real Estate Industries	*0*	*62*	*62*	*2.3*	*0*	*64*	*64*	*3.2*
09 Finance, Insurance and Real Estate	**0**	**95**	**95**	**2.8**	**0**	**98**	**98**	**4.1**
802 Elementary and Secondary Schools	0	1,442	1,442	35.4	1	1,563	1,563	37.5
807 Libraries, Museums and Other Repositories	0	1	1	0.0	0	2	2	0.4
01 Education and Related Services	*0*	*1,443*	*1,443*	*35.5*	*1*	*1,565*	*1,566*	*37.9*
821 Hospitals	0	945	945	20.9	0	968	968	21.0
828 Welfare Organizations	0	68	68	2.7	0	77	77	1.3
02 Health and Welfare Services	*0*	*1,013*	*1,013*	*23.6*	*0*	*1,045*	*1,045*	*22.3*
849 Miscellaneous Amusement and Recreation Services	0	66	66	2.8	0	86	86	1.7
04 Amusement and Recreation Services	*0*	*66*	*66*	*2.8*	*0*	*86*	*86*	*1.7*
866 Offices of Lawyers and Notaries	0	2	2	0.0	0	4	4	0.0
867 Offices of Management and Business Consultant	0	4	4	0.1	0	6	6	0.0

(continued)

APPENDIX I *(continued)*

	1986				1987			
	Number of Claims			*Days of Temporary Total Disability (000)*	*Number of Claims*			*Days of Temporary Total Disability (000)*
INDUSTRY	*Fatal*	*Non-Fatal*	*Total*		*Fatal*	*Non-Fatal*	*Total*	
869 Miscellaneous Services to Business Management	0	3	3	0.0	0	2	2	0.0
05 Services to Business Management	*0*	*9*	*9*	*0.1*	*0*	*12*	*12*	*0.1*
899 Miscellaneous Services NES	0	1	1	0.0	0	2	2	0.3
08 Miscellaneous Services	*0*	*1*	*1*	*0.0*	*0*	*2*	*2*	*0.3*
10 Community, Business and Personal Service Industries	**0**	**2,532**	**2,532**	**62.0**	**1**	**2,710**	**2,711**	**62.3**
902 Defence Services	1	648	649	18.0	0	661	661	16.4
909 Other Federal Administration	3	1,396	1,399	28.0	2	1,493	1,495	31.2
01 Federal Administration	*4*	*2,044*	*2,048*	*46.0*	*2*	*2,154*	*2,156*	*47.6*
931 Provincial Administration	4	3,005	3,009	71.8	1	3,248	3,249	76.6
02 Provincial Adminsitration	*4*	*3,005*	*3,009*	*71.8*	*1*	*3,248*	*3,249*	*76.6*
951 Local Administration	2	6,344	6,346	170.1	0	6,625	6,625	186.2
03 Local Administration	*2*	*6,344*	*6,346*	*170.1*	*0*	*6,625*	*6,625*	*186.2*
991 Other Government Offices	0	1	1	0.0	0	8	8	0.5
04 Other Government Offices	*0*	*1*	*1*	*0.0*	*0*	*8*	*8*	*0.5*
11 Public Administration and Defense	**10**	**11,394**	**11,404**	**287.9**	**3**	**12,035**	**12,038**	**310.9**
Total for Schedule 2	**12**	**22,376**	**22,388**	**633.7**	**12**	**23,399**	**23,411**	**661.7**

1. Days lost due to temporary total disability up to initial settlement for claims initially settled in year indicated.
2. Industry Classification: Standard Industrial Classification 1970.

Ontario
Ministry of
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